

# The Chemical Age

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**NOTICES.**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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## The Near Eastern Crisis

AT the moment of writing the risk of war in the Near East seems to have almost disappeared, but whatever happens, there is a point that needs emphasis. It should be made clear that we should not have gone to war for the benefit of trade in the Near East. Some of the credit or discredit for every war has always been planted on the shoulders of the trader. In the process of churning up the enthusiasm of a people for a given cause it always seems necessary to throw in a few trading considerations. The American War of Independence was associated with the throwing of tea into Boston Harbour, and many folk are still under the impression that this disastrous enterprise was conducted in the interests of the tea-tray. The same idea is promulgated at every street corner to-day by the Socialists who claim that war is engineered by the capitalists for the purpose of gain. For this reason it should be rubbed in hard that whatever justification might exist for further hostilities in the Near East, there are no trade considerations which would justify the firing of a single shot. The Straits have never been closed to commerce in history. They were closed in 1914 by the Turks, who were then

in possession, because they were opposed to us in war—there cannot be a shadow of doubt that the next time there is war involving that part of the world, the Power in possession of the Straits, whoever it may be, will close them. But, apart from war, nobody ever thought, or ever will think, of closing the Straits. Even if they were to be permanently closed, the damage would not be worth fighting about. The Straits have in the past been chiefly useful as a road to Russia, but no Russian trade is likely to be worth very much for some generations to come. Persia, and the oilfields are, of course, of some importance, but if we were sole owners of the lot, they would not pay for a fortnight's war on a modern scale. Commerce is a peaceful occupation; war is never justified by commerce, nor is it ever desired by commercial people, and no opportunity should be lost to make this clear.

## Adsorption as a Factor in Corrosion

It would be almost impossible for the most enthusiastic student of the causes and prevention of corrosion of ferrous and non-ferrous metals to assimilate the whole of the voluminous literature which has appeared in connection with the subject during even recent years. Iron in its various forms has, of course, been accorded the major share of attention, and when one considers its enormous commercial importance it is not difficult to appreciate of what moment the solution of the problem is. The non-ferrous metals have not, of course, been given nearly so much study, but their growing importance in industry has in late years prompted a good deal of research as to the mechanism of their corrosion. Articles which have appeared in our columns from time to time have dealt with the more commonly accepted theories, and our readers have, therefore, had an opportunity of keeping themselves informed of the latest developments. It will be as well, however, for attention to be directed to some opinions which are given by Dr. Saklatwalla, the superintendent of the Vanadium Corporation of America, in the current issue of our contemporary, *Chemical and Metallurgical Engineering*.

It appears that the phenomenon of adsorption whereby gases are condensed on the surface of a metal would have the tendency of imparting surface activities depending on the degree of adsorption. The opinion has been advanced that the film of adsorbed gas on the surface of a solid body shows a decreasing density within the film and outwardly from the surface in contact with the body, so that at the actual surface of contact the density of the film corresponds to that of the solid body. Accordingly, the body will not be surrounded by the atmosphere in which it exists, but by a film of highly condensed gas constituting that atmosphere. The rate of inter-

action between the condensed gas of the film and the solid body will depend on the density of the film. If a body has a high degree of adsorption, the condensation and consequent interaction velocity will be great, and hence surface oxidation of the solid will take place quickly, probably instantaneously. We can thus see how a protective film will be formed immediately, which, if it has the necessary physical qualifications of homogeneity, right thermal expansion, and so on, will prevent or slow up the velocity of further interaction. Again, if part of this protecting film is removed by abrasion, the original metal surface, capable once more of adsorption, comes into play and immediately replaces the film which has been removed. Dr. Saklatwalla says, therefore, that the corrodibility of a solid in an atmosphere of gas will depend upon its capability of adsorbing the gas to a greater or less pressure, thus increasing or diminishing the velocity of surface interaction. In fact, the higher the adsorption capability the higher should be the ability to withstand corrosion. This attempt to connect adsorption and corrosion opens up a highly interesting subject for discussion; and, providing that further research confirms the relation, we may find ourselves provided with a ready method of judging between the suitability of different alloys and metals for specific purposes.

### Poisoning by Infected Food

RECENT cases of food poisoning have again focussed public attention on this important subject, and as usual our old friend the "ptomaine" has been accused of causing the deaths of several persons who in one case partook of some wild duck paste. It is really time that our responsible newspapers learnt that the idea that such outbreaks are due to "ptomaines" is now definitely exploded, and it is a matter of surprise to find that even many of the scientific publications, especially on the medical side, still view the ptomaine as the *fons et origo* of food-poisoning. The word "ptomaine" was first used by Selmi to denote a poisonous principle generated in decomposing foods, especially meat foods, and several of the principles have been isolated and studied. But it is not widely realised that these substances are rarely if ever present in foods that are not obviously bad and unfit for human consumption. The ptomaine is a product of the breaking down of nitrogenous (protein) compounds; and not until putrefaction of the food has become well established are these toxic principles present. The likelihood of poisoning by foods so altered as to be uneatable, by reason of their obviously decomposed condition, is at least remote in civilised countries. Further, it is contended by W. G. Savage, the acknowledged authority on food poisoning in this country, that the poisonous properties of these bases or "ptomaines" have been much exaggerated, and that the experiments showing their toxicity have invariably been inoculation experiments on animals. Many substances which are highly toxic when injected directly into the blood-stream are, however, inactive, or only slightly toxic, when taken into the stomach by the mouth, and it would appear that there is no good evidence of the dangerous nature of ptomaines when ingested in this way. The point

of importance is that it has not been proved that ptomaines taken by the mouth in food have ever given rise to the characteristic symptoms of food-poisoning.

The vast majority of outbreaks of food-poisoning are now known to be due to certain pathogenic bacteria and their toxins. It follows that it is generally useless to submit suspected food to chemical analysis in these cases, unless the possibility of chemical contamination has to be considered. What is required is a bacteriological examination of the food remnants and of the blood and excreta of the victims, and, in post-mortem cases, of certain organs of the body. Certain cases which have recently occurred were due to infection with the *bacillus botulinus* and its very virulent toxin, both of which were found in the suspected food. From the public point of view, it is desirable that there should be an assurance that all possible steps are being taken to guard against further similar outbreaks. Unfortunately, our knowledge is not yet sufficiently advanced to enable us absolutely to prevent a recurrence of these cases of botulinus poisoning. We do not know how the food becomes infected, though the organism concerned has been found in the soil, and in the intestines of animals.

It is not generally understood that by far the larger number of cases of food-poisoning are caused by a bacillus of the Gaertner group of organisms. This group comprises *Bac. enteritidis*, *Bac. paratyphosus B.*, and *bac. suipestifer*. These organisms are not natural inhabitants of the alimentary tract of healthy animals, and their presence in foods is evidence that the animal from which the meat-food was prepared was diseased, or that the infection was conveyed through the food having come into contact with a human or animal carrier of the organism. Our knowledge of these infections is yearly becoming more comprehensive, and it may be expected that in the near future, we shall be able to take such precautions in the preparation and handling of foodstuffs as will ensure that all these bacterial infections will become far less common than at present. In this connection the Medical Research Committee, aided by the State, has already accomplished much good work.

### The Manufacture of Ultramarine

A CORRESPONDENT writes to know if we can provide him with any information concerning the composition and manufacture of ultramarine. As the matter is one which may interest quite a number of our readers we have considered it as well to deal with it fairly fully. Nowadays, one can obtain green, red, and violet ultramarines. These last-named pigments have been so designated on account of similarity in composition and manufacture, and owing to the fact that they are produced from blue ultramarine, which up to 1826 used to be made from the blue mineral lapis lazuli. The chief materials utilised in the manufacture of ultramarines are kaolin or purified clay, silica, sodium carbonate, caustic soda, sodium sulphate, and sulphur. In addition carbon, pitch or rosin are used as reducing agents. All these materials must be as pure as possible, and the most dangerous impurity is iron, of which no more than 0.5 per cent. must be present in the mixture, otherwise a dark ultramarine is formed.

Owing to the secrecy which is being observed by all producers, the manufacture of ultramarine has scarcely made any progress for the last hundred years. There are single stage and double stage processes of manufacture. The single stage process (one burning), though slightly more expensive from the point of view of materials, is far more economical as regards fuel, labour and time. All materials are carefully dried, the kaolin being calcined to remove water of combination, and they are then finely ground and thoroughly mixed.

There are innumerable formulæ in use. Having an eye to the ultimate composition one could freely alter these. A satisfactory mixture is the following:—

	Per cent.
Kaolin .. .. .	30.5
Silica .. .. .	6.5
Caustic soda .. .. .	0.5
Sodium carbonate .. .. .	27.0
Sulphur .. .. .	31.5
Carbon .. .. .	4.0

The burning of the mixture is carried out either in tightly closed crucibles or muffle furnaces, the crucibles being stacked on top of one another inside a kind of flattened brick kiln. The art of burning consists not only in adhering to correct temperatures, but also in preventing access of air to the mass and in discontinuing the burning at the moment the free sulphur has almost disappeared. The cooled mixture is removed from the crucibles or muffles and finely ground under water. The various batches are then sorted according to their tint, filtered, dried, and sifted. In addition to its use in paints and in laundry work, ultramarine is employed in sugar refining, cotton printing, etc. For household purposes it is frequently made into balls or cylinders with the aid of an adhesive, and sometimes mixed with calcium sulphate or sodium bicarbonate. It is also employed in the manufacture of genuine blue mottled soap.

### British Industries Fair, 1923

ALTHOUGH last year's British Industries Fair was admittedly a great success, everything seems to point to an even better show next year. It is, perhaps, rather early to discuss events as remote as February next, but judging from the rate at which applications for space are coming in already, it would appear that the matter is one of current interest. There have been several references in the Press recently to the possibility of the White City, the home of the London section of the Fair, changing hands before next February, with the consequent result that the Fair would not be held there in 1923. We are credibly informed, however, that there is nothing connected with the future of the White City that will prevent the Fair from being held there as usual. With regard to the chemical section, which was such a prominent feature of the last Fair, we understand that the Association of British Chemical Manufacturers has again decided to organise a collective exhibit on the same lines as last year, except that it is intended to be even larger than it was then. The British Chemical Plant Manufacturers' Association is also considering, and will probably decide to organise, a combined exhibit.

It has not yet been decided what portions of the buildings will be allocated to the various industries represented at the Fair, but it is probable that the chemical section will again be housed in the large hall immediately inside the Shepherd's Bush entrance. This hall is one of the most desirable of the exhibition buildings, and it is more than likely that chemical exhibitors will endeavour to secure it again. This should not prove very difficult, particularly as the authorities are obviously very sympathetic towards the industry, and are really anxious to make the 1923 exhibition thoroughly representative of British Chemical industry. It is interesting to note that practically all the big chemical manufacturers who were exhibiting at the last Fair have already booked their spaces, and that individual firms are taking larger spaces than before. Some of the chemical stands at the last Fair were so small that exhibitors experienced considerable difficulty in making a good display of their products. In view of the somewhat experimental nature of the chemical section and the state of trade at the time, a certain timidity on the part of exhibitors was perhaps justifiable, but with the gratifying success of the first real chemical exhibition to look back upon, and the reductions in the price of space and of shell stands which have just been announced the chemical industry should be able very widely to increase the scope and interest of its particular section of the Fair.

### Points from Our News Pages

- The relative advantages of the various artificial silk making processes are described by Mr. Rex Furness (p. 522).  
A report is given of the proceedings at the inaugural dinner of the Institute of Paint and Varnish Technology (p. 525).  
In connection with the departure for India of Dr. M. O. Forster, a short resumé of his career is given (p. 527).  
A report is given of Dr. E. F. Armstrong's lecture before the Manchester Section of the Society of Chemical Industry on the hydrogenation of fats (p. 528).  
Sir Ernest J. P. Benn, Bart., contributes a further article on the subject of the elections and trade (p. 533).  
According to our London Market Report there has been considerable activity during the week, the turnover having reached fair proportions, while prices generally are on the up-grade (p. 539).  
According to our Scottish Market report there has been some improvement in business, with values generally steady (p. 541).

### The Calendar

Oct.		
16	Institution of Rubber Industry	Midland Hotel, Manchester.
16	The Faraday Society and the British Cold Storage and Ice Association. Joint Meeting to discuss "The Generation of Low Temperatures." 2.30 to 4.45 to 6, and 7.45 to 10 p.m.	Institution of Electrical Engineers, Victoria Embankment, W.C.2.
16	Chemical Industry Club: Annual General Meeting.	2, Whitehall Court, S.W.1.
17	Hull Chemical and Engineering Society. "Carburation and Carburettors." G. F. O'Riordan. 7.30 p.m.	Hall Photographic Society's Rooms, Park Street, Hull.
18	Institute of Physics. "Physicist in Electrical Engineering." Dr. C. C. Paterson. 6 p.m.	Institution of Electrical Engineers, Victoria Embankment, W.C.2.
19	The Chemical Society: "The Polarity of Double Bonds." T. M. Lowry. 8 p.m.	Burlington House, Piccadilly, W.1.

# The Manufacture of Artificial Silk

By Rex Furness

*The writer, who during the past three years has contributed a number of informative articles to our columns, describes the various processes which have been employed for the manufacture of artificial silk. Particular attention is given to the viscose process, which is shown to be, probably, the most satisfactory method. The new cellulose acetate silk is considered, while attention is given to the latest solvent for cellulose—namely, calcium thiocyanate, and a new process of artificial silk manufacture is foreshadowed.*

ARTIFICIAL silk must be regarded to-day as a standard textile, since it will adapt itself to the operations of spinning, twisting, weaving, softening, finishing, dyeing, and the like. It is suitable for the manufacture of all kinds of dress materials, trimmings, braidings, etc., and may be used in mixed textiles. It can be produced in filaments of uniform diameter, varying from one to seventy thousandths of an inch, and its cross section may be round or shaped and irregular. Artificial silk is tenacious and elastic, and can serve either as warp or weft in the loom. It can, moreover, be produced either lustrous or dull in appearance, and may be bleached, and otherwise treated by chemicals. Many of the grades of artificial silk can be dyed with non-fading dyes, and in general the wearing qualities of artificial silk leave nothing to be desired. Its universal acceptance may be gauged from the fact that even a few years ago there were over thirty factories producing the silk, and to-day it is certain that fifty tons per day are being manufactured in Europe and America.

The process which has taken first rank is the so-called viscose process, but the methods in which nitro-cellulose and a solution of cellulose in an ammoniacal copper solution are employed, are still producing quantities of artificial silk, and must be considered. The silk from cellulose acetate, which has still to establish itself in popular favour, will come to the fore in the near future, for many of the inherent difficulties have been solved.

It is proposed to describe each process in some detail, special attention being given to the viscose process, in several of its chemical aspects. The order maintained will be that in which the various processes were developed.

It should be noted, however, that the earliest process of producing artificial filaments—by the solution of cellulose in zinc chloride solution and subsequent precipitation—will not be discussed, as practical success has not yet been realised.

## Nitro-Cellulose

The production of artificial silk from a form of gun cotton was the first process to be realised commercially. A large amount of investigation and research preceded the application of nitro-cellulose solutions in ether-alcohol mixtures to the manufacture of artificial silk. Chardonnet commenced to take out patents about 1884, and in 1890 was producing about 50 kilos per day of the new silk at Besançon. The working details were gradually improved so that the factory was enlarged, and new works built in many of the European countries. The fortunes of the various Chardonnet plants have varied, as indeed have the selling prices of the silk, which have varied between about 10s. and 20s. per lb. At the present time the process has been almost entirely superseded by the viscose process, but works still exist in Belgium and elsewhere. It is quite recently that the Belgian Government reduced the alcohol tax with a view, in part, to allow of economies being effected in the artificial silk manufacturing operations. It should be noted that about 5 litres of alcohol are lost per kilogram of silk produced by the Chardonnet process.

The process consists in forcing an ether-alcohol solution of nitro-cellulose through fine jets of glass or metal into water, or some suitable solvent for the ether-alcohol. The cellulose is thus precipitated as a fine thread, and is collected for subsequent spinning, twisting, etc. It may be of interest to outline one of Chardonnet's original patents, for improvements have chiefly occurred with respect to the mechanical side of the operations.

In British Patent, 1886, No. 2211, Chardonnet proposed to force a viscous solution of nitro-cellulose in ether-alcohol through fine jets made of glass, by means of a pressure of 2-3 atmospheres. The filament was produced by solution of the cellulose solvent in water, and was seized by a fine pair of pincers and led over reels or bobbins. In later processes the nitro-cellulose solvent was removed by means of a current of

warm air, and the filaments spun as usual. The silk so produced was, however, inflammable and was difficult to dye, and a denitration process was consequently evolved. The silk, after spinning and twisting, was treated with ammonium hydrosulphite, and almost all the nitro groups removed. NO<sub>2</sub> can, however, be detected in small amount in present-day nitro-cellulose silks.

The denitration operations and the bleaching and finishing treatments are carried out after the collection of the filaments to a sufficient thickness and twisting. The silk so produced is of a brilliant lustre, surpassing natural silk, and will take dyes reasonably easily. The process, however, was never entirely successful in this country.

Many improvements in nitration, spinning, etc., have been made, and reference only can here be made to the processes of Lehner, who succeeded in reducing the pressures required for the forcing of the viscous solutions through the jets.

One of the principal disadvantages of the process is the loss of valuable solvent. Attention has been directed to this and to possible economies by the success of the Bregat solvent for ether-alcohol. This consists of a mixture of the cresols, which has much greater absorptive efficiencies than known recovery solvents, and yields up the volatile solvent—ether-alcohol—by heating to 150° C. The cresols are capable of use with humid air, carrying volatile solvents, and are non-corrosive.

None the less, the nitro-cellulose silk is manufactured to a relatively small extent to-day, and even as early as 1900 it was in competition with silks produced by the cuprammonium process.

## Cuprammonium Process

A cheaper solvent for cellulose was found in a solution of copper in ammonia. The artificial silk processes of the Vereinigte Glanzstoff Fabriken as originated at Elberfeld, Germany, and adopted throughout Europe, were anticipated by the work of Pauly. Thus, in his British patent of 1897, No. 28,631, Pauly produces the cellulose solvent by treating copper turnings, in contact with a more electro-negative metal such as platinum, with ammonia, and passing a current of air at a low temperature, say 4° C. The solution prepared in an earthenware vessel is used at a concentration of 15 gms. per litre. The cellulose—cotton linters—is freed from oil, by means of a caustic soda treatment, and dissolved to the extent of 45 gms. per litre in the cuprammonium solution, to which copper sulphate solution may be added if necessary. The solution of the cellulose is effected in the cold—below 30° C.—by standing for some days. The filtered cuprammonium solution of cellulose is forced through fine jets into dilute acetic acid and wound upon rollers rotating in this "spinning bath." The subsequent proceedings of winding and twisting, etc., are carried out as described above.

The present practice of the cuprammonium process is little different in essential to the original methods. The bath in which cellulose is precipitated from its solution may be varied, and many patents have been granted for modifications of this spinning bath solution. Thus, it has been suggested to add glucose to the solution, so that copper is precipitated by reduction in the form of a sludge. Acid and alkaline baths have been suggested, but, in all, the copper and ammonia are dissolved or precipitated, leaving a fine filament of cellulose, which is wound upon bobbins, and twisted from small reels or bobbins, dried, and finished in any suitable manner. The cuprammonium silk is a fine product and uniform in diameter, and is lustrous and useful for specific purposes such as the manufacture of braid trimmings, etc., but it is gradually being ousted by the viscose silk, which can be produced in infinite varieties, of different cross section and suitable for all uses.

### Viscose Process

The manufacture of artificial silk by the viscose process bids fair to supplant most of the other processes. The discovery of cellulose xanthate by Cross and Bevan in 1892 led the way to the manufacturing processes as developed by Courtauld and Co. in this country. The origin and development of the viscose process may therefore be said to be entirely British, and the methods evolved for the technical working of the cellulose xanthate process have been applied in many of the European countries and in America. The adoption of this method in England has resulted in the abandonment of other types of process, and even the Glanzstoff cuprammonium factory at Flint, Wales, is now manufacturing according to the xanthate method, having been taken over by Messrs. Courtauld during the war period. As yet there is little cellulose acetate silk being manufactured in this country.

The nitro-cellulose and cuprammonium processes are still in operation on the Continent in various places, but are strongly rivalled by the viscose process.

This process possesses a great advantage in that the starting material is spruce wood pulp, or other pulp, spruce, however, being the most suitable.\* The source is abundant, the cost of preparation reasonably small, and the subsequent steps of dissolving the cellulose not too expensive. Spruce wood in suitable pieces is boiled in calcium bisulphite, and spruce pulp made in the ordinary manner.

It is interesting and relevant to note that in the production of spruce pulp, as a cheap starting material for artificial silk production, valuable by-products are obtained. Thus, para cymene is obtained in considerable quantities, and methods are now available for its easy refinement. For reasons of lack of space, references only can here be made to certain applications of para cymene. McKee and Lewis (*Chem. Met. Eng.*, 1921, 969) have shown that a most efficient fat splitting agent akin to the Twitchell reagent can be made from para cymene.

Thymol has been successfully manufactured from cymene by nitration, reduction, sulphonation, diazotisation, and removal of the diazo group, and conversion of the  $\text{SO}_3\text{H}$  into OH (Phillips and Gibbs, *J. Ind. Eng. Chem.*, 1920, 733). In addition, cymene has been of great use as a high boiling solvent in many instances (Wheeler, *J. Amer. Chem. Soc.*, 1920, 1842). Spruce pulp is pressed into sheets and treated with alkali. The excess of alkali is removed and the mass disintegrated. It is now submitted to a process of oxidation which may be catalytically accelerated. This stage is of interest and is discussed more fully later.

On treatment of the oxidised alkali cellulose with carbon disulphide vapour, cellulose xanthate is produced as a brown mass, soluble in dilute caustic soda to a golden yellow viscous solution, or "viscose." In the process of maturing the cellulose xanthate the latter progressively breaks down; and in the end probably cellulose hydrate is produced. For the manufacture of silk, however, an intermediate stage is required, and it is one of the manufacturer's secrets as to how to regulate the maturing and vary its extent so that the filaments subsequently produced shall vary in accordance with his requirements. Many influences combine to afford variety in the finished silk: the oxidation of the alkali cellulose, the maturing of the xanthate, the nature of the spinning bath, etc.; but of these the maturing is by no means the least important.

The cellulose xanthate solution is forced through fine jets into the precipitation or spinning bath, in a manner analogous to that originally employed in the Chardonnet process. The bath may contain ammonium salts, mineral acids and salts, glucose and acid, zinc salts, sodium bisulphite, etc., and the filament varies according to the nature of the spinning bath. The filaments are collected on bobbins, twisted from these, and worked up by washing, bleaching, etc.

The silk produced by the viscose process is of infinite variety, can be used for all kinds of textile operations, dyes readily—although large amounts of work still require carrying out in this direction—and is capable of cheap production since

the starting materials are cheap and losses in the process are not to be compared with those obtaining in the nitro-cellulose silk process.

### Oxidation of Alkali Cellulose

It was noted above that one important factor in the successful production of artificial silk by the viscose process was the oxidation stage. The late Mr. Wilson, of Courtauld's, has described the process in *J.S.C.I.*, 1920, 177 T. Spruce wood pulp, treated with strong alkali and pressed free from excess, is allowed to oxidise in the air. The amount of oxidation required is slight, but the process may be accelerated by the addition of an oxidising salt, such as sodium peroxide, and (or) a catalyst. For instance, by the addition of one per cent. of sodium peroxide to the caustic soda used in the soaking process, the same amount of oxidation of the alkali cellulose takes place in five hours as is effected in four days by simple exposure to the atmosphere, in the absence of the peroxide. Similarly, finely divided metal oxides accelerate the oxidation by air or reagents. The oxides of Ni, V, Co, Fe, Ce, Mn, Cr, may be used, but Ni oxide is the best. Thus, pulp is impregnated with a nickel salt, so that the equivalent of 0.25 per cent. Ni is left on precipitation. On immersion in caustic soda containing 0.8 per cent. sodium peroxide, sufficient oxidation of the alkali cellulose takes place in half an hour.

### Dyeing of Artificial Silk

The beautiful lustre and satisfactory mechanical properties of artificial silks would be of little avail if the silk could not take dyes of many ranges and types. This question is one which is causing difficulties in the case of cellulose acetate silk—more fully considered later.

In the case of viscose silks, satisfactory results can be obtained in almost every shade, but the process is not without its difficulties in this case also. It is preferable from the point of view of the dyer that artificial silks should be capable of being dyed from ordinary dye baths, and that no special conditions or treatment be essential for success. This has been accomplished in the case of many dyes, but some give uneven colourings. In the case of many natural fibres, any uneven absorption of the colour from the dye bath may be concealed in the subsequent textile manufacturing operations. In the case of the filaments of artificial silk, differing dye affinities of the fibres—possibly due to slight differences in diameter—show up in the finished goods. Many colours are available, however, including basic dyes, direct cotton colours, sulphur and vat dyes. (With mordant dyestuffs, too, uneven colours are produced at times by the uneven absorption of the mordant, and in combination dyeing, one dyestuff giving uneven dyeing will not be covered by another giving even shades.)

Wilson and Miss Imison (*J.S.C.I.*, 1920, 322 T.) have shown that uneven dyes are usually those of high molecular weight, and conversely, those of low molecular weight give even shades upon viscose silk. The qualification of the dye is in no way effected by its chemical constitution so far as could be determined up to the time of the experiments reported. Many examples of suitable dyes are given, and it is shown that dyestuffs of molecular weight of about 500 dye artificial silk evenly, whilst some of molecular weight of 900 give uneven shades. These experiments refer to operations in dye baths at 50° C., but it is shown that at 75° C. many dyestuffs giving uneven shading at 50° C. are perfectly satisfactory.

Although there is scope for much experimental investigation in the field of artificial silk dyeing, the beauty and wide range of materials in viscose silk which are available and in daily use demonstrate that the initial difficulties have been overcome, and whilst improvement will be welcomed as in every branch of industry, no dissatisfaction can reasonably be expressed by users of the present silks.

### Cellulose Acetate Silk

Cellulose acetate came very much to the fore during the late war as a constituent of the dope applied to aeroplane wings. Expert inquiry in England, France, Italy and the United States resulted in the product of the Dreyfus brothers being recognised as the most acceptable. On this account large factories were built in the various countries, and attention is now being diverted to the manufacture of silk from cellulose acetate. The solution of the cellulose ester in suitable solvents can be spun in the ordinary manner in the required type of pre-

\* In a general article on artificial silk (*Chem. & Met. Eng.*, 1922, p. 533) which has appeared since this article went to press, Schlatter states that viscous silk manufacturers in America are now using cotton linters almost exclusively, but such a procedure can clearly be economically feasible only in cotton-producing countries such as America.

precipitation solution and the filaments collected, twisted, and worked up. The silk so produced—apparently at higher cost than that derived from the relatively cheap spruce pulp—presents certain difficulties in the process of dyeing, but on the other hand, it is very elastic and impervious to moisture. It presents little difficulty in the loom, and breakages are almost completely absent. Cellulose acetate silk has a very low electrical conductivity, and is, therefore, of great use in insulating work. Cellulose acetate silk has other special features, such as its ability to stand a short mercerisation treatment, and is claimed to be of use in many specific applications.

The general application of cellulose acetate silks, however, will be greatly influenced by their capacity of taking dyes of all shades and compositions, from ordinary dye baths. Advocates of the rival processes have made claim and counter-claim in this connection, but it would appear that the dyeing of cellulose acetate silk is not so easily accomplished as that of viscose silk. Nevertheless, methods are available for the use of basic, direct cotton, vat, indanthrene and sulphur dyes with cellulose acetate silk. Thus, it has been shown by Brigg before the Society of Dyers and Colourists—(*vide* CHEMICAL AGE, October 29, 1921, p. 527)—that acetate silk can be dyed in two distinct ways. If direct application from an ordinary dye bath is practised and no modification of the silk is effected, the colour must be chosen specially, and the range is limited, just as with cotton, wool, or other material, special affinities must be considered. By suitable modification of the acetate silk, however (a partial saponification or hydrolysis from the surface inwards being induced and cellulose partly regenerated), any basic, sulphur, substantive or vat dye can be directly applied with no more difficulty than in the case of other artificial silks.

There is further the possibility of developing azo dyes on the silk itself, since the latter has a great affinity for aromatic amines, phenols, etc., and a wide field is thereby opened.

New special dyes will be manufactured as the demand grows, and it is thought that the dyer will accommodate himself to modified methods, if such be required. If this obtains, the superior water-resisting qualities of acetate silk, allowing frequent laundry operations, its high electrical and thermal resistance, etc., will no longer be counter-weights set against dyeing difficulties, but will be additional attractions.

It will remain with the producers of this silk to demonstrate to the dyers that slight changes in operation with this silk—if necessary at all—are of relatively little inconvenience, and that the end justifies the means. Cellulose acetate silks, dyed in perfect shades, beautiful in texture and lustre, impervious to moisture, elastic and electrically insulating, have been exhibited, but production in large quantities is still delayed. The cost of acetic acid and anhydride is very high. The original plan of the British Cellulose Co., to manufacture synthetic acid in England from calcium carbide, has had to be abandoned, temporarily at least. Solvents for the acetate are expensive at the moment, too.

Thus, acetate silk will have a stern economic struggle with the well-established viscose silk, but should come into its own, in specific applications if not in general.

#### Cellulose Acetate Manufacture

The developments in the manufacture of the cellulose ester itself may be briefly indicated, for, even if opinion is divided on the question of the application of cellulose acetate in artificial silk manufacture, there can be little doubt that the Dreyfus processes for the production of the acetate itself marked a distinct advance.

A large amount of theoretical work preceded the patent applications of Miles, from about 1905 onwards, but this chemist seems to have first succeeded in making reliable and consistent qualities of the ester on a large scale. Up to the period of the Miles processes, cellulose acetate had been made soluble only in expensive toxic solvents. Miles showed that by a process of "ripening," in which progressive hydration and removal of the acetyl groups took place, acetate of cellulose soluble in acetone, etc., could be obtained. It should be noted that the chloroform-soluble product was first produced and then "ripened" to form the acetone-soluble, chloroform-plastic material.

Dreyfus, commencing in 1910-1911, described processes in

which direct acetylation of cellulose was employed to give the acetate the requisite physical properties and solubilities. The products of the Dreyfus processes are not soluble in chloroform but in a mixture of chloroform and alcohol. The infinite complexity of the question of solubility of the cellulose acetates cannot be more than indicated; but the Dreyfus product gives viscous solutions, from which cellulose acetate films can be produced of great tensile strength and elasticity, and resistant to water. The use of such solutions in the manufacture of aeroplane dopes has already been indicated.

#### Thiocyanates as Solvents

It has recently been shown that the thiocyanates of calcium, strontium, magnesium, manganese, lithium, etc., are excellent solvents for cellulose when in hot aqueous solution. The solutions must have certain definite physical properties, such as a slight but definite heat of dilution, fairly high boiling point, minimum possible viscosity, etc. In addition, other salts may be added, provided that they do not react with the thiocyanate solution, in order to bring the properties of the mixed solution within the range demanded for cellulose solution.

Calcium thiocyanate, either alone in aqueous solution or mixed with calcium chloride solution, has been found to be an excellent medium for cellulose solution.

A neutral solution of calcium thiocyanate, of such a concentration that it boils at 135° C., and of specific gravity 1.2, will dissolve bleached cotton or chemical wood pulp at a temperature of 80°-100° C. Solutions boiling below 133° C. and above 150° C. will not effect solution of cellulose. The addition of a little acetic acid will facilitate the solution of the cellulose, from a mechanical standpoint, as the formation of the thick gelatinous mass due to the swelling of the fibres of cellulose does not take place in this case.

Similarly, a mixture of equal volumes of calcium thiocyanate and calcium chloride solutions, each boiling originally at 140° C., is stated to possess superior solvent properties for cellulose.

Finally, the addition of 25 per cent. of formaldehyde solution will allow of cellulose solution at ordinary temperatures—4 per cent. (of the weight of the solution) of chemical wood pulp being taken into solution.

The above facts, disclosed at the annual meeting of the Society of Chemical Industry in Canada, 1921, foreshadow a new process for the manufacture of artificial filaments. The relatively cheap chemical wood pulp can be employed, solution effected in an inexpensive manner, and since the dilute solutions of the thiocyanates do not dissolve cellulose, it would appear that precipitation of the filaments in an extremely simple spinning bath should be possible. Losses in the precipitation operations should be small, and collection, spinning, twisting, etc., of the individual filaments from the fine jets through which the thiocyanate solution of cellulose would be forced, should present no greater difficulties than in the case of viscose silk manufacture. Further than this it would be unwise to predict, for, as many unsuccessful processes demonstrate, the solution of cellulose in a cheap solvent is not the solution of the problem of artificial silk manufacture, in all its ramifications.

The adaption of suitable spinning baths to the thiocyanate solution of cellulose should be possible, however, but whether the variety of filaments possible in the viscose process can be realised, is another matter.

The thiocyanate process has many theoretical advantages and much to recommend it on the surface, and its progress will be watched with interest.

In conclusion, it must be conceded that the viscose process has won a well-merited popularity and general adoption, since it is economical, and can offer an artificial fibre at a relatively low cost. The fibres can be made in many varieties, and suitable for many kinds of fabrics. They are beautifully lustrous, although dull fibres can be produced if necessary, and are strong enough—if inferior to natural silk—to pass undamaged through textile manufacturing operations. The silk is easily dyed, from ordinary dye baths, and in general behaves as an ordinary and natural textile. Its dyeing qualities still receive attention, however, and efforts are continually being made to increase its strength, elasticity and water resisting properties.

## Paint and Varnish Technology

### Dinner to Inaugurate Proposed Institute: Provisional Council Appointed.

ON Wednesday at the Restaurant Frascati, Oxford Street, London, members of the Paint and Varnish Society and the Oil and Colour Chemists' Association and others met at dinner, after which it was unanimously decided to take steps to form an Institute of Paint and Varnish Technologists. Sir Ernest J. P. Benn, Bart. (Chairman of Benn Brothers, Ltd.) presided, and among others present were Professor H. E. Armstrong, Professor T. M. Lowry, Dr. F. Mollwo Perkin, Dr. R. S. Morrell, Dr. J. N. Friend, Dr. M. B. Blackler, Messrs. T. Hedley Barry, G. H. Howse, Noel Heaton, J. Cruikshank Smith, H. D. Bradford, H. A. Carwood, W. F. Reid, W. J. Palmer, C. Harrison, and C. A. Klein.

Sir ERNEST BENN said that as a technical publisher he was perhaps able to realise as well as any the tremendous difficulties, not only of discovering and acquiring the scientific knowledge upon which the success of industry depended, but the equally great difficulty of spreading that knowledge and communicating it to others. It was not too much to say that as a people we depended to a considerable extent for our health and comfort, as well as for the satisfaction of our sense of beauty, upon the scientific skill which could be brought to the service of the paint and varnish industry. It was certainly true to say that as a nation our commercial supremacy chiefly depended upon our ability to grapple with the problems of the application of science to industry. In this respect the proposed new Institute had the advantage of a happy blend of the theoretical and the practical. There were present at the gathering not only masters of the science upon which our industries are founded, but experienced practical men of business, and it was because of the willingness of the two classes to co-operate that the success of the Institute seemed to him to be assured.

#### Principles of Association

Continuing, Sir Ernest said we were living in times which he believed would be known in history as the "Committee Age." It was probably no exaggeration to say that there existed in the world to-day millions of committees, councils, associations, unions and institutes. There was not a minute section of human thought or activity which was not the excuse for founding one or other of these bodies. And yet they were there considering the inauguration of still another. It seemed to him, therefore, appropriate that they should just consider for a moment the principles upon which men could usefully associate together. History would, he thought, decide that the great bulk of the collective work of the present generation was futile, useless and retrograde, and our successors would be able to distinguish, in a way that was not clear to us, the difference between the good and the bad in this matter of association.

He suggested that there was one simple test that we could and should apply. We lived by production and exchange, and he lent to the view that exchange was even more important than production. But however that might be, it was essential that we should produce and exchange. Associations, unions, institutes which had the effect of increasing and facilitating production and exchange were obviously good for mankind. Those bodies, on the other hand, whose object was to limit thought or restrict either production or exchange seemed to him to be definitely opposed to public interest. Associations which had for their object the uplifting and improvement of the individual could not fail to do good. Those which by any process tended to restrict the individual or apply force to him seemed to him to be open to grave criticism. We had had too much force and too little knowledge in the world, and it was because the Institute of Paint and Varnish Technology was to be founded with the object of promoting knowledge that he was there to welcome and support it.

In conclusion, Sir Ernest said he hoped that in all their schemes and arrangements they would keep an ever-open eye for opportunities of co-operation with labour. In their search for new ideas, for genius and brains, they would find a due proportion—if they would look for it—in the labouring ranks. It was, in his judgment, possible that if we had in the past extended greater opportunities to the brains down below to

occupy themselves with technical and scientific problems, we should not have driven, as we had driven, many good and true and capable citizens to satisfy their yearnings for intellectual exercises by the unedifying study of Karl Marx.

Dr. F. MOLLWO PERKIN mentioned that he had been president of both associations, and he had always been in favour of the union which was now proposed. He regretted to say that in the past there had been a lack of combination between the technical and business sides of the paint and varnish industry. In many cases manufacturers employed chemists to do ordinary routine tests, and did not encourage them to devise improvements in processes, etc. He agreed with Sir Ernest Benn that greater opportunities should be afforded to the labouring classes. He, personally, had learnt much from such men, and there was always the possibility that a paint mixer might be able to impart information which, in combination with the technical knowledge of the chemist, would improve a certain process. Dr. Perkin emphasised the need of research and of co-operation between all branches of the industry, and expressed the opinion that when the interests of all concerned were combined, as they would be in the proposed Institute, the industry would go ahead very rapidly.

Dr. NEWTON FRIEND, dealing with the functions of the proposed Institute, said that one of them was to have a live journal which would help them to keep abreast of modern developments. It would also encourage research throughout the country, and in this connection he observed that original research was one of the finest possible trainings for students. The industry as a whole should, if progress was to be made, be able to look to one centre, and such a centre would fitly be the proposed Institute. Although some of the paint manufacturers had their own research laboratories, they generally devoted their energies to the solution of problems of immediate interest to themselves; the research which would be undertaken by the Institute would be on much wider lines. He thought that the Institute, properly constituted, might be of the greatest possible service to the paint and varnish industry and to the world at large.

#### Organised Research

Mr. W. F. REID agreed with previous speakers on the question of research but held that research at random was largely useless. He was convinced that a powerful Institute representing the industry as well as the scientific side would command the support and influence the opinion of the public. It would represent large capital and large bodies of men, and the field of activity before it was enormous. Referring to the diminution in supplies of gums, Mr. Reid suggested that the Institute would be able not only to encourage the production of substitutes for gums, but also to test them and say whether they were good or bad. The Institute could also influence the education of future members, and the question of a professional status might ultimately be considered.

Dr. M. B. BLACKLER said that the Institute, to be successful, must have money. As there was no doubt that its work would benefit every paint and varnish manufacturer in the country, he suggested that each firm should make a yearly subscription to the Institute; the contributions could be *pro rata* to the capital of the company. He also urged the establishment of a status for the paint and varnish chemist.

Mr. H. D. BRADFORD then gave a resumé of the work of the Paint and Varnish Society. In 1907, he said, the initial stages of the movement for co-operation and the exchange of knowledge in the industry, of which the proposed Institute would be the outcome, was brought about by several "old" students of technical classes in London deciding to meet to read and discuss papers. So promising were the prospects of the Society that in 1914 it was proposed to form an institute on the lines of the one they were now considering, but the favourable opportunity passed before the scheme could be carried out. The Council of the Society wished him to express the hope that all interested in the application of science to the manufacture of paints and varnishes, protective and decorative coatings, and allied products would co-operate in the interests of the industry at large.

Mr. T. TYSON said that the Oil and Colour Chemists' Association was formed in 1918 by about ten chemists, who were engaged in research on linseed oil and fatty acids. From this small beginning their membership had increased to over 200, and they had now a balance of roughly £300 to their credit. They had considered it necessary for the Association to have a good journal, and that their proceedings should not be indiscriminately communicated to the Press; he thought this was one of their strongest points. The Journal was growing and they were now obtaining advertisements for it. Ever since the Association was formed, papers had been read covering the industry from all standpoints. He thought it would be a mistake to call the new body the Institution of Paint and Varnish Technology, as this title might tend to limit its appeal.

Mr. CRUIKSHANK SMITH said that the broad aim of the proposed institute should be the good of the industry on the practical side as well as on the scientific. He referred to the advantages of having a properly incorporated body, mentioning the limitation of financial obligations and increased security and prestige which would thus be secured. Giving a rough definition of the aims of the Institute, he said it would generally promote, encourage, and carry out whatever might assist the industry, particularly from the technological point of view. It would afford members an opportunity of reading papers and would help to maintain a high standard of qualification among its technical members. This part of its functions might briefly be described as the examination of professed scientific members and the education of the rest. The promotion of scientific research and the collation and distribution of data would be another essential function. The Institute should also provide a reference library and meeting room for members. He was convinced that a common line of action could be found, and by the hearty co-operation of the united bodies the best interests of the industry would be served.

He then formally moved "that steps be taken forthwith to form an Institute of Paint and Varnish Technology."

#### Benefit of the Industry

Dr. R. S. MORRELL, in seconding the resolution, said that what he had heard that night had made him decide to give the proposal his hearty support. From the provincial members' point of view he emphasised the usefulness of a journal of proceedings, and entered a plea for organised research on raw materials, about many of which they knew so little. He wanted it to be a real live institute, an institute of young men. It would bring together two bodies which had not always worked in harmony, and he was sure that such a combination would be of immense benefit to the industry.

Professor T. M. LOWRY thought the proposed institution would be an extremely busy and useful one, and wished it all good luck.

Mr. NOEL HEATON said he was convinced that the time was ripe for the formation of an institute, and the advantages of the proposal were quite obvious. He approved of the suggestion that manufacturers should contribute in proportion to their capital, and if all did this an annual contribution of about 10 guineas per firm would be enough to establish it on a firm basis.

Professor H. E. ARMSTRONG said he was quite prepared to give the proposal his blessing, although he did not approve of the progressive sub-division of different branches of chemical activity. He wanted to see all chemists working together. In Brussels there was a handsome building called the Palais des Academies, and he would like to see a similar edifice in London labelled the "Palace of Chemistry." With regard to the proposal to form a library, he thought it would be more advantageous for them to make use of and add to the Chemical Society's library at Burlington House. Dealing with the association of science and industry, Professor Armstrong said that many people were under the impression that we wanted more science in industry. He thought, however, that what we really wanted was more industry in science. He also suggested the elimination of the word "research," because the term conveyed nothing to the public and also because it was becoming a Government concern and was being standardised.

The resolution, as proposed by Mr. Cruikshank Smith, was then put to the meeting and carried unanimously.

Mr. G. H. HOWSE then proposed that a provisional council should be elected as follows: Dr. J. N. Friend, Dr. R. S. Morrell, Messrs. S. G. Clifford, E. S. Hanes, S. K. Thornley, A. de Waele, W. J. Palmer, and H. A. Carwood (all of the Oil and Colour Chemists' Association), Dr. F. M. Perkin, Dr. M. B. Blackler, Messrs. Cruikshank Smith, W. F. Reid, A. S. Jennings, C. Harrison, Noel Heaton, C. A. Klein, and H. D. Bradford (of the Paint and Varnish Society).

Mr. Howse thought that the institute would serve a most useful purpose from the manufacturers' point of view by providing a better knowledge of raw materials, thus enabling them to produce their goods more economically and of a uniform standard of excellence. He wanted to see the establishment of a sort of professional status for the paint and varnish industry, and there was no reason why their workpeople should not be as well paid and provided with the amenities which workers in other industries, such as engineering, enjoyed. One line of research in the new Institute might very well be specially directed to the production of a suitable substitute for turpentine. The difficulty of providing money for the attainment of their objects was not, in his opinion, a great one. There were roughly 250 paint manufacturers in this country, and if they all paid even £10 a year they would have an income of £2,500. Of course, some of the larger firms would be able—and probably willing—to make a larger contribution, but, in any case, the sum he had mentioned would not hurt anyone. As an insurance against ignorance it would be well worth the money.

Mr. T. H. BARRY then seconded the resolution for the appointment of the provisional Council, and Mr. Tyson suggested that it might be better to elect the Council by ballot. The chairman explained that there would be no difficulty in adding additional members to the Council if it was thought necessary. The resolution was then carried unanimously.

The CHAIRMAN, in conclusion, said that although he had been connected with trade associations and similar bodies nearly all his life, and had been present at the birth of a great many of them, he could not remember one for which a better case had been put, and he wished the new Institute every possible prosperity.

#### Wholesale Druggists' Indian Losses

THE creditors interested in the voluntary liquidation of Leonard Horner and Sons, Ltd., wholesale druggists and exporters, 14 Tower Hill, London, E.C.3, were called together on Tuesday, at Winchester House, Old Broad Street, London. The chair was occupied by Mr. H. G. Sidford, who has been appointed to act as liquidator. The chairman stated that the business carried on by the company was a very old one. Mr. Leonard Horner was the sole proprietor of the business until it was taken over by a private limited company as from June, 1919. The downfall of the company had been brought about through the repudiation of contracts by Indian merchants. The Indian department was only started about ten years ago, and it was conducted from a separate office. The company had gone down solely through the Indian department, and the rest of the business was still a sound proposition. Since his appointment as liquidator he had continued the business. Mr. Horner acted as manager, and it was hoped that a reconstruction would take place, or that there would be a sale as a going concern. Negotiations in that direction were proceeding, but the matter should be carried through as quickly as possible in order that the company's connection might be retained. In the time at his disposal he had not been able to prepare a detailed statement of affairs, but figures were got out some little time ago. According to figures showing the company's position as at June 30 last, it appeared that the assets totalled £10,622. With regard to the liabilities, the claims of creditors amounted to £5,435, but in addition there were various claims in connection with the Indian department. It was estimated that those claims would total something like £40,900, and that figure might be exceeded. In addition, there were some contingent claims, and there might be claims put forward by various agents. The representative of Frederick Allen and Sons (Poplar), Ltd., stated that it was the general wish of the creditors that the business should be continued. No resolutions were passed, and therefore the voluntary liquidation of the company will be continued, with Mr. Sidford as liquidator.

## Dr. M. O. Forster

### Departure to take up Indian Appointment

DIRECTOR of the Salters' Institute of Industrial Chemistry since the end of 1918, Dr. M. O. Forster sailed from Tilbury yesterday (Friday) on the *Morea* to take up the position of Director of the Indian Institute of Science, Bangalore, founded through the munificence of the late Mr. J. N. Tata.

Born on November 8, 1872, Dr. Forster developed a liking for chemistry at an early age, his first tuition being received at the Finsbury Technical College under the late Professor Meldola. While still in his teens, Dr. Forster went to Würzburg, where he came under the direction of Emil Fischer, graduated Ph.D. and obtained his first job—before he was 20 years old—as assistant to Sir William Tilden, who was at that time professor of chemistry at the then Mason College, Birmingham.

#### Association with Emil Fischer

Interviewed on the eve of his departure by a representative of THE CHEMICAL AGE, Dr. Forster recalled with intense pleasure his association with the famous German. "It was," he said, "a great inspiration to work under Fischer, and in common with every English student who became associated with him, I count it a high privilege to have been one of his pupils. It was, therefore, a very real happiness to me to have been chosen to deliver the Emil Fischer Memorial Lecture."

When Sir William Tilden proceeded from Birmingham to the Royal College of Science, Dr. Forster came to the Central Technical College under Professor H. E. Armstrong with a Salters' Research Fellowship. The end of 1895 saw him installed at the Royal College of Science as demonstrator in chemistry, and in 1902 he succeeded Professor Wynne as assistant professor of chemistry at the Royal College; this post he held until the end of 1913.

#### Work of the Salters' Institute

Soon after the formation of British Dyes, Ltd., Dr. Forster was appointed chairman of the technical committee for that company, and was elected to the board a year later. Resigning from the board on the amalgamation of the company with Levinsteins, Ltd., Dr. Forster was appointed Director of the Salters' Institute of Industrial Chemistry, where he has rendered invaluable service in the quiet unassuming way which is characteristic of the man. Referring to the work of the Salters' Institute, Dr. Forster said that during the past three years it had rendered well-timed assistance to chemistry students—principally ex-service men whose training was interrupted by the war—in the granting of substantial fellowships which would enable them to pick up the broken threads of their careers. A considerable number of these fellowships have been awarded and almost all the recipients have been fortunate in obtaining remunerative openings. In addition, the Institute has made a large number of smaller grants to quite young chemical assistants, helping them in the purchase of books and the payment of evening class fees.

Dr. Forster, who gained the Granville Scholarship at London University on graduating D.Sc. in 1899, joined the Chemical Society in 1892, was elected to the Council in 1901, was made Hon. Secretary in 1904, and became Treasurer in 1915, in which year he was the recipient of the Longstaff Medal. In 1905 he was elected a Fellow of the Royal Society, and a member of the Council of the Institute of Chemistry; he served in the latter capacity until 1908, and again from 1912 to 1915. He was a vice-president of the Institute from 1908 to 1911, and from 1915 to 1918. A member of the Society of Chemical Industry since 1899, he was Prime Warden of the Dyers' Company in 1919-20, and during the past eight years has been a member of the Senate of the University of London as a representative of Convocation in Science; for the last two and a half years he has also rendered valuable service as chairman of the Council for External Students.

Not the least of the rôles so capably sustained by Dr. Forster was the presidency of the Chemistry Section of the British Association in 1921, at the annual meeting of which he delivered a fascinating address on "The Laboratory of the Living Organism." He has also served as a member of the Dyestuffs Advisory Licensing Committee since its inception in January, 1921.

#### Research Work

Discussing his research activities, Dr. Forster said the work he had done so far was divisible roughly into two classes—derivatives of camphor, and organic compounds containing the triazo group, principally in the fatty series. He found the latter investigations extremely interesting, but too exciting, as many of these compounds possess highly explosive properties which, however, did not seem to be sufficiently uniform for military application. Among his publications are over 80 papers in the Transactions of the Chemical Society; these deal mostly with camphor derivatives, and the chemical nature of the oximes, hydrazones, semi-carbazones and azides.

One of Dr. Forster's favourite recreations is walking, and when in a reminiscent mood he can relate a wealth of interesting memories of knapsack walking tours in Norway, the Dolomites, the Pyrenees and many other places. At one time or another he has travelled practically all over Europe, and has paid a number of visits to Canada and the United States. He has also some very happy recollections of a visit to South Africa with the British Association in 1905.

On October 6 Dr. Forster was entertained at dinner at Oddenino's Imperial Restaurant by a number of scientific friends. Sir William Tilden was in the chair, and was supported by Professors H. E. Armstrong, J. S. S. Brame, J. T. Hewitt, W. R. E. Hodgkinson, T. M. Lowry, G. T. Morgan, W. H. Perkin, J. C. Philip, Sir W. J. Pope, Messrs. J. L. Baker, A. C. Chapman, B. Dyer, E. V. Evans, F. E. P. Forster, C. S. Garland, A. J. Greenaway, E. G. Hooper, H. Levenstein, S. Miall, G. T. Moody, W. F. Reid, J. A. and E. W. Voelcker, F. A. H. Whetmore, and W. J. U. Woolcock, M.P.

## German Gas Mantles

### Import Duty Imposed under Safeguarding Act

THE Board of Trade have made an Order, which comes into force forthwith, applying Part II of the Safeguarding of Industries Act to mantles for incandescent lighting and component parts thereof, whether finished or not, manufactured in Germany. The effect of the Order (Safeguarding of Industries (No. 2) Order, 1922) is to impose an import duty of 33½ per cent. *ad valorem* on the class of goods referred to, if manufactured in Germany.

The Board of Trade have directed that certificates of origin shall be required so far as concerns the class or description of goods covered by the Safeguarding of Industries (No. 2) Order, 1922, in the case of goods consigned from all foreign countries in Europe.

The necessary instructions have been issued to H.M. Consular Officers in the countries concerned, and the form of certificate of origin already prescribed by the Board of Trade in connection with the previous Order (No. 1) will be applicable.

#### A Soap Manufacturer's Failure

MR. MAURICE HASSAN, of 26, Shattisbury Avenue, London, W.C., who formerly carried on business as a soap manufacturer, attended before Mr. Registrar Hope at the London Bankruptcy Court on Tuesday for his public examination on a statement of affairs in which he had returned his liabilities at £2,048 and his assets at £150. Some 13 years ago he began business as a manufacturer of soap and cleaning materials under the style of the Socleano Co., at 25, Nassau Street, London. Later on he removed to 23, Denmark Place, Charing Cross Road. In 1916 he joined the Army and was not demobilised until December, 1918, the business being managed by his brother during his absence. In December, 1919, the debtor was joined in partnership by another person who paid him £250 for a one half share of the profits and found a further £100 as capital. On March 1 of the following year a third party joined them who paid the debtor £250 and his partner £100 and introduced a further sum of £500 as capital. The business was continued under the same trading name until May, 1920, when they registered a company called Socleano, Ltd., with a nominal capital of £5,000 divided into £1 shares. Under an agreement dated May 28, 1920, they transferred their business to the company and received as consideration 2,000 shares as fully paid, of which 400 were given to the debtor. He also became a director. He attributed his insolvency to depreciation of stock and to consistent bad trade. The examination was concluded.

## The Hydrogenation of Fats

### Practice and Theory in the Solution of an Industrial Problem

THE Manchester section of the Society of Chemical Industry held its first meeting for the Session 1922-23 at the Textile Institute on October 6. Dr. E. Arden presided, and Dr. E. F. Armstrong, the President of the Society, was also present.

The Chairman said that the next meeting would be a joint one, between the Manchester Sections of the Society of Chemical Industry, the Society of Dyers and Colourists, the Institute of Chemistry, and the Manchester Literary and Philosophical Society. They were fortunate in having Dr. F. W. Aston, of Cambridge, to come and speak to them about "Isotopes." Professor Bragg, as a representative of the Manchester Literary and Philosophical Society, would preside at the meeting. There was also something in the nature of an innovation to announce. A joint meeting had been arranged between the members of the Manchester Section and the Liverpool Section. This joint meeting would be held in Manchester and a paper would be read by Dr. Levinstein.

It was hoped that next session another joint meeting would be held in Liverpool. Reciprocity of that character could not but be helpful to the general interests of the Society, and also be very advantageous to the members of the two sections.

#### The Problem of Fat Hardening

Dr. E. F. Armstrong then delivered an address entitled: "Practice and Theory in an Industrial Problem," the main object of which was to illustrate the extreme breadth of chemical problems, and the necessity for breadth both in the training and in the mind of the chemist if he is to succeed in his profession.

Dealing with the problem of fat hardening, Dr. Armstrong said that in the first place, historically, a laboratory investigation carried out by an eminent French savant led to the discovery that if certain organic substances were passed together with hydrogen over finely divided metals, reduction of these organic substances took place; that was to say, if they contained an unsaturated linkage, that hydrogen was added to these linkages and they became saturated. That sort of fact was well known, or fairly well known, in connection with such metals as platinum and palladium, but it was a definite advance in our theoretical chemistry when nickel was found to have this power. Sabatier, who discovered this, naturally exploited the field as rapidly as he could. Among other things he tested the behaviour of the unsaturated fatty acids and fats towards this new reagent, with very indifferent success.

Among others, continued the lecturer, a certain Dr. Norman saw the bearing of Sabatier's observations on the fat industry. He tried very hard successfully to apply Sabatier's discoveries. He found, as anyone would find in tackling a problem of such magnitude with limited capital, that the difficulties on the chemical side were small, but on the plant side very large. The process passed out of Dr. Norman's hands to that of a larger or more powerful firm, and they again found that, perfect as Dr. Norman's work had appeared to be, there was a very great deal to be done before the process could be worked out.

#### Electrolytic Hydrogen

It was illuminative to allude to some of those difficulties, because they would demonstrate the hundreds of ways in which the chemist had to exercise his ingenuity; how he had to be master of all trades, and how considerations of all kinds, in addition to those of the text book equations, entered into his daily life. Taking as an instance the problem of fat hardening, Dr. Armstrong pointed out that nothing could be simpler in theory; an unsaturated double bond, hydrogen and a catalyst, and there was the saturated fat. In practice, first of all, twenty or twenty-five years ago, hydrogen was only wanted in the laboratory and on a small scale for balloons; nobody knew how to make pure hydrogen in quantity cheaply. Therefore, the would-be hardener of fats had to find out how to make hydrogen. Electrolytic hydrogen was, of course, an attractive source, but on the other hand the

costs of the plant, the prime costs, and the lack of any outlet for oxygen, which, of course, was formed at the same time, proved great difficulties in the way of making cheap hydrogen by that process. Alternate methods, acids on iron, and various other methods, all broke down from the point of view of cost, and the only method which seemed to promise success to the manufacturer was that of taking water gas, which, roughly is 40 per cent. CO and 40 per cent. H and getting rid of the CO. Even the manufacture of water gas in those days was in a very crude state. Producers could be bought, but the life and the repair cost, and so on, left much to be desired. Therefore the prospective exploiter of the chemical process found at the outset that his energies were dragged right back to what was almost a gas engineering, at any rate a chemical engineering, problem of his producer plant.

#### Methods of Obtaining Hydrogen

There were obviously two methods of getting hydrogen—the one to scrub out the CO, which, of course, was developed by the Badische Co., the other to make use of the reaction between CO and steam to give CO<sub>2</sub> and hydrogen. That was done by passing the CO over iron oxide, *i.e.*, the water gas, to give iron in the free state, and CO<sub>2</sub>, stopping that current, and running steam at a proper temperature over the iron; in that way decomposing the steam into hydrogen and iron oxide. It was therefore what might be called a cyclic reaction—first the passage of one gas, and then the passage of another gas, at the proper temperatures to get reaction. The hydrogen had to be free from the material that was fed in first, CO. All this presented problems of great difficulty. Originally, these problems were solved, more or less empirically, by dint of hard work on the part of the chemist on the spot making careful trials, and keeping data added by the engineer. In later days the physical chemist had come to our assistance, and by a proper use of dynamics and various heat equations, and so on, had done much to facilitate the establishment of the ideal conditions of the laboratory. But in the main such work, valuable as it was, merely served to confirm the results which were arrived at empirically by the hard working men on the spot.

Dr. Armstrong next dealt with the production costs of hydrogen, and stated that the electrolytic process of making hydrogen suffered from a high capital cost, unless it was carried out in a country with unlimited cheap water power. The relative commercial values of saturated and unsaturated oils were next discussed.

#### Treatment of the Catalyst

Dr. Armstrong then dealt at some length with the question of the catalyst, and the importance of obtaining a large surface area with the aid of pumice stone, kieselguhr, etc. The surface was very delicate and sensitive and must be very carefully preserved, and there must be no over-heating of the catalyst. There was a wonderful literature based on catalyst poisons—and also a very wonderful jargon. It all amounted to this: that if anything acted injuriously on the surface the activity of the catalyst was reduced.

The hardening reaction took place quite fast. It was done in big vessels, a good many tons at a time. The determination of hardening value took some little time, and the determination of the melting point took a long time. The determination of the refractive index, a physical method, was the only quick method. The theory of the reaction was then dealt with by Dr. Armstrong, who illustrated his formulæ on the blackboard, and mentioned the work done by Lord Rayleigh, Hardy, Adam and Langmuir.

In conclusion, Dr. Armstrong said that work of the kind he had indicated could only be done as the result of team work. Team work could only be done as the result of the utmost loyalty, self sacrifice and good feeling. His experience, limited as it was, had left him with a feeling that the training chemists received, the analytical training, that was to say the training of suspicion, had made them much less ready to mix together, much more critical of their fellow chemists than was desirable in the best interests of the profession.

## Testing of Petroleum Products

### Work of the Standardisation Committees

At a meeting of the Institution of Petroleum Technologists, held on Tuesday at Burlington House, London, Dr. A. E. Dunstan, F.I.C., read a paper on the "Standardisation of the Testing of Petroleum and its Products," in the course of which he said that the standardisation of the testing of a raw material and of its manufactured products usually followed at some considerable distance from the commercial exploitation of these substances. A new industry had too much to occupy its attention at the outset, and its customers, potential and actual, were not as a rule hypercritical. Some industries never attained to standardisation, a glaring example being the coal trade, which even to-day sold its products on the most superficial description and without any guarantee of thermal value.

In certain cases standardisation of quality was compulsory by legal enactment, and a specialised technique of testing had been set up, to wit, for certain foodstuffs, and more recently for the heat value and purity of coal gas. Not often had an industry itself set to work to investigate and publish a system of accurate and dependable criteria for the benefit of its customers, and it must therefore be particularly gratifying to the Council of the Institution of Petroleum Technologists that its efforts, representative of the whole personnel of petroleum—scientific, technical and commercial—should have received the co-operation of Government departments, and many widely spread organisations, far flung throughout the Empire.

After detailing the arguments which had been advanced regarding standardisation of testing Dr. Dunstan referred to the formation of the Standardisation Committee. The main committee, he continued, had appointed the following six sub-committees:—

**SUB-COMMITTEE 1.—Naturally Occurring Bituminous Substances.**—James Kewley, F.I.C., A. E. Dunstan, D.Sc., F.I.C. (Chairman); J. L. Jeffery, A.R.S.M., M.Inst.M.M., J. E. Hackford, F.I.C., W. J. Wilson, A.I.C., Robert Redwood, A. A. Ashworth, A.M.Inst.C.E., Peter Kerr, and F. B. Thole, D.Sc., F.I.C.

**SUB-COMMITTEE 2.—Distillates up to Kerosene.**—A. E. Dunstan, D.Sc., F.I.C. (Chairman), W. R. Ormandy, D.Sc., F.I.C., G. Rudolf, J. J. Fox, D.Sc., F.I.C., W. L. Baillie, S. E. Bowrey, B.Sc., W. J. Wilson, A.I.C., Peter Kerr, E. Lawson Lomax, M.Sc., H. T. Tizard, and A. G. Marshall.

**SUB-COMMITTEE 3.—Kerosene and Intermediates.**—Robert Redwood (Chairman), Peter Kerr, W. J. Wilson, A.I.C., W. A. Woodrow, W. F. Higgins, A.R.C.S., and J. J. Fox, D.Sc., F.I.C.

**SUB-COMMITTEE 4.—Lubricants.**—F. B. Thole, D.Sc., F.I.C., (Chairman), S. E. Bowrey, B.Sc., W. F. Higgins, A.R.C.S., T. M. McKenzie, A.I.C., G. Rudolf, Ph.D., F. H. Garner, Ph.D., Eng. Captain W. M. Whayman, C.B.E., R.N., W. L. Baillie, Wm. Lee, and E. A. Evans.

**SUB-COMMITTEE 5.—Liquid Fuels.**—Professor J. S. S. Brame, F.I.C. (Chairman), Eng. Captain W. M. Whayman, C.B.E., R.N., F. H. Garner, Ph.D., W. J. Wilson, A.I.C., Arnold Philip, A.R.S.M., F.I.C., and W. A. Woodrow.

**SUB-COMMITTEE 6.—Asphaltum and Artificial Residues.**—J. E. Hackford, B.Sc., F.I.C. (Chairman), R. G. Batson, T. M. McKenzie, A.I.C., F. H. Garner, Ph.D., P. E. Spielmann, Ph.D., F.I.C.

Dr. Dunstan then gave an outline of the work of the various sub-committees, giving details of the tests and decisions made by each.

Referring to the tolerance which he said should be allowed in the majority of the determinations, the author gave the following reasons in support of his assertion:—(1) To allow for the personal error of the operator; (2) To allow for variation from standard in the apparatus used; (3) To allow for conditions out of the control of the operator—e.g., lighting, climate, etc.

He took as an illustration the determination of specific gravity of benzene with the hydrometer. Personal error in reading graduation, which might amount to 0.0005 units variation from standard in this case would not arise if the hydrometer had been calibrated by the National Physical Laboratory, but the temperature correction might bring about another error, seeing that an omnibus correction of 0.0004

per degree F. was usually employed for all and sundry gasolines. Consequently, it would be necessary to decide what tolerance was advisable. In purely visual tests the question of tolerance was complicated; the copper test for corrosive sulphur in benzene was one example. The operator had to judge whether a strip of copper was discoloured or not. It was obvious in such a case that personal opinion must enter and that it would be necessary to provide each operator with a standard strip, which indicated the precise amount of discoloration that was permissible. Again, in the use of calorimeters it was almost impossible to arrive at exact matching with a standard glass under certain conditions—e.g., health and of lighting. In such an instance a wide tolerance must, of necessity, be permitted.

### Collaboration with Manufacturers

A further and very important line of activity would be the providing of accurate data to manufacturers to assist the attainment of uniformity and the adoption of most convenient construction of standard forms of apparatus. Meetings would be arranged between the Standardisation Committee and the principal instrument-making firms for this purpose. Viscosimeters, flash point apparatus, distillation flasks, thermometers, hydrometers, colorimeters, sulphur estimation apparatus and various special glassware would be considered. It appeared reasonable to suggest that the National Physical Laboratory should be asked to co-operate—firstly, by storing a standard pattern, and secondly, by verifying models submitted to them, or supplying material of guaranteed constants for calibration purposes.

Arrangements had been made whereby Professor Brame would edit a special brochure containing the recommended and tentative tests which had been decided upon by the Committee. It was hoped that this brochure would appear early in the New Year, and it would, of course, be subject to periodical amendment, revision and supplement.

Referring to the fact that none of the sub-committees had expressed an opinion of the correct method of taking samples, Dr. Dunstan said that Mr. Arnold Philip had laid down some details of procedure at the Admiralty laboratory. The Board of Trade Committee on Fuel Oil also had this matter under consideration, so that there was ample material in existence on which the Standardisation Committee could work.

### Discussion

THE PRESIDENT (Professor J. S. S. Brame) referred to the two bodies with which the Standardisation Committee has been associated, namely, the American Society for Testing Materials and the British Engineering Standards Association. The Committee had adopted, as far as possible, the methods which had been agreed upon by the A.S.T.M., and the relations between the two bodies had been most cordial. The Committee could not see eye to eye with the A.S.T.M. in every case; there were a number of points to be raised for discussion between the Committee and the A.S.T.M., where the Committee had proposed modifications of the methods adopted by the American body, and there was every reason to hope that the Committee would be met with the same spirit of co-operation which had been exhibited throughout. The Institution had officially become associated with the A.S.T.M., and had joined as a co-operative body. The A.S.T.M. had invited the Institution to nominate a member to sit on its Standardisation Committee, and Mr. A. Duckham had accepted that office.

Mr. A. DUCKHAM (Chairman of the Standardisation Committee of the Institution) said that it was not necessary at first to be too meticulous with regard to agreeing upon accurate methods. They wanted to provide for the industry really practical comparable standards, so that one man could compare his work with that of another. The work of the Committee would be amplified as time went on, and the members of the Institution must not consider that they had a final standardisation. With regard to nomenclature, the Committee felt that that was not very important for the moment and could be left until the more important question of testing was dealt with.

Mr. LE MAISTRE (Secretary, British Engineering Standards Association) referred to the value of the help which was being given to his Association by the Committee, especially when they came to deal with the testing of fuel oils and lubricating oils, which they were about to take up. The B.E.S.A. had

sectional committees, each representing a branch of the engineering industry, and once a sectional committee was formed it had autonomy and governed the whole of the work. As to the work on petroleum products, they were including motor spirit, and he could not help feeling that, with the help which would be given by the Institution, the work of the B.E.S.A. would be of great practical value to the country.

Mr. ANFILOGOFF asked whether the methods recommended by the sub-committees would become British standard, or would it be optional for the people in the trade to use those methods.

THE PRESIDENT replied that it was not within the power of the Institution to compel the use of any method, but if such an Institution made recommendations that certain methods were best for particular purposes, and that certain types of instruments should be employed, and if in contracts and in specifications as laid down by such a body as the B.E.S.A., those methods were referred to, without in any way compelling people to adopt them, he believed, *ipso facto*, they would become standard methods and generally adopted.

Mr. ANFILOGOFF, referring to the sulphur test, said that if a laboratory were to be equipped with one calorimeter for the purpose of obtaining calorific values and sulphur tests for fuel oils, he did not see why the lamp method should be adopted for one grade of petroleum product and the bomb method for another, more especially as, presumably, the actual analysis took as long with the lamp method as with the bomb, and there was no reason why they should not adopt the bomb for all. This was equally useful for petrol and fuel oil.

Mr. ARNOLD PHILIP pointed out that a standard method would be one which need only be used in cases of dispute. Probably a standard method agreed by the Committee was not the best; it represented a compromise. He had his own fads, and would not accept a standard method fixed by any committee for use in everyday work in the laboratory; but, on the other hand, he rejoiced in the work of the Committee, because, when disputes arose, they had to be decided by standard methods of test laid down in the contracts. It might probably be necessary to use the standard method only once in fifty times.

Mr. E. R. REDGROVE said that some methods were well known to chemists, and others came as a revolution. Whether what appeared to be revolutionary methods were the best could be proved only by time, and the lay members would be glad to take the opinion of the Standardisation Committee and, if the methods proved best, to adopt them. Tolerances were important, and very desirable from the point of view of the operator, but the Committee was likely to meet with opposition from the legal and commercial men on this point. They would not allow tolerance for personal error, differences of temperature, pressure, and other things which combined to thwart the accuracy of chemical analyses. If it could be accepted as a fact that tolerance must be allowed, that would be one of the great features of the work of the Standardisation Committee.

Mr. GORDON PITT said there were many who had not the equipment, or the time, and sometimes not the necessity, to apply very elaborate and very accurate methods of testing, and it would be very valuable if the Committee, in addition to recommending standard methods, would recommend simple alternative methods which could be used in everyday routine work, and also for a second line of standardisation of not such extreme accuracy, but of very great everyday value.

Mr. E. H. CUNNINGHAM CRAIG said he was glad to hear that the Committee was investigating the question of solubility tests for solid materials, because there were points in that connection which might be of very great use both to the chemist and the geologist. Less than three years ago he had had long discussions with Guthrie on methods of making solubility tests on solid materials; they wanted them to apply to oil shales, etc., and they had arrived at a method which they thought would be useful. It might be very useful if all those materials were considered, because it would enable them to get a line through all the different materials used in retorting.

Sir FREDERICK W. BLACK referred to the percentage of asphalt in oils for Diesel engines. He was disappointed to see that the Committee had stated that there was great divergence of opinion as to the percentage, and that no opinion was stated on the methods of testing. They all knew there were great differences of opinion on the point, but these

seemed to be differences of opinion as to specification rather than as to testing methods. As to the viscosity of fuel oil, some of the old specifications used to say that the standard should be that the oil ran freely through a pipe of a certain diameter, but it was always felt that there would be differences of opinion as to what the free running of the oil through the pipe really meant.

Mr. A. F. GRESSLER (New York) congratulated the Institution on the work it was carrying out. It was a great international question, and he was glad to note that some of the things done in America had been adopted here. Specifications should be standardised in such a way that there would be no confusion and no occasion for disputes regarding quality. The deterioration of oil in storage, he agreed, was important; with volatile oils the volatility, for instance, would decrease.

### Dangerous Chemicals in City Office Claim under Workmen's Compensation Act

IN the Mayor's and City of London Court, on October 5, before Judge Jackson, Mrs. Annie Wickett, 30, Church Row, Bethnal Green, claimed £70 against the Salisbury House Estate, Ltd., and the Products Corporation, Ltd., both of Salisbury House, London Wall, London, E.C., for damages suffered. Mr. Fior appeared for the plaintiff, Mr. Duckworth appeared for Salisbury House, and Mr. Holt for the Products Corporation. Mr. Fior said the plaintiff was employed by the Salisbury Estates, Ltd., as an office cleaner. The Salisbury House Co. had as one of its tenants the second defendants, the Products Corporation, Ltd., who were dealers in chemicals. The plaintiff had been in the habit of cleaning the offices of the Products Corporation for the Salisbury House Estate Co. The Products Corporation had been in occupation of the offices for 18 months. On February 18 last the plaintiff was cleaning out the offices of the Products Corporation, and underneath one of the desks in the office, which was rather dark, were two large carboys of caustic potash in rather crude form. She knocked her broom against one of the carboys and the liquid started running away. She commenced to clean up the liquid with a duster and her hand smarted. Later on, when she went to wash her hands, a chemical reaction set up, when her hands were severely burned as well as one of her feet. The Salisbury House Co. had admitted their liability under the Workmen's Compensation Act for the period during which the plaintiff was incapacitated, and had brought that sum into court. The Products Corporation denied that they had been negligent in keeping what was a dangerous chemical on the premises. The Products Corporation had had the chemicals in their offices at their own risk. The carboys of chemicals were evidently not properly kept, and therefore one or other of the defendants were guilty of negligence. The plaintiff should have been warned of the presence of chemicals and their danger in a City office. The Products Corporation had stated that they could take no responsibility, as they had told the Salisbury House Co. of the chemicals being on the premises, and that office cleaners should be told not to touch them. The plaintiff had had no such warning.

Mr. Holt urged that the accident was caused by the plaintiff's own negligence in not exercising proper care in handling the carboy.

Judge Jackson said he did not think the carboy was put in a sufficiently safe place. The bottle was not cracked, and it was broken accidentally. There ought to have been a warning, and there was not; the plaintiff was not guilty of contributory negligence. He must find for the Salisbury House Co. with costs, and he would find for the plaintiff against the Products Corporation for £40 5s., with costs.

### Finsbury Technical College Old Students' Association

THE eleventh annual dinner of the Finsbury Technical College Old Students' Association will be held at the Engineers' Club, Coventry Street, London, on Saturday, November 4, when the chair will be taken by the President, Mr. W. G. Head, M.I.Mech.E. Old students of the College may obtain tickets (price 10s. 6d. each) and particulars of the Association from the Hon. Secretary, Mr. H. P. Guy, 74, Silver Street, Edmonton, London, N.18.

## Chemical Engineering Group Complimentary Dinner to Mr. H. Talbot

A DINNER, followed by a presentation to Mr. H. Talbot, will be held under the auspices of the Chemical Engineering Group of the Society of Chemical Industry, at the Hotel Cecil, Strand, London, on Friday, October 20, at 7 p.m. An entertainment, which will include a full and varied programme of musical and humorous items has been arranged, and full particulars regarding the arrangements may be obtained from Mr. J. Arthur Reavell, Chairman of the Chemical Engineering Group, 24, Buckingham Street, Strand, W.C.2.

Mr. Talbot, who combines great personal charm with an unusual capacity for organisation, has been untiring in his efforts to further the objects of the Group and it is anticipated that a goodly number of his many friends will be present to do him honour.



Mr. H. Talbot

Born near Leeds, Yorkshire, 37 years ago, Mr. Talbot was educated at various private and secondary schools in Leeds and Manchester. He came to the Royal College of Science, London, with a National Scholarship some 20 years ago, graduating in both chemistry and engineering with unusual distinction. Subsequently he did important research work with Sir Edward Thorpe, C.B., and was later appointed Lecturer in the Imperial College of Science and Technology, which post he held for some years.

He went through the shops of an engineering firm in Leeds, and later came to London and joined the Volker Lighting Corporation. He served for some years with this company, finally being appointed works manager.

At the outbreak of war, being rejected for military service, Mr. Talbot took over in succession the direction of a number of companies manufacturing various explosives and other chemicals for the Ministry of Munitions. Later he joined the Handley Page Aeroplane Co. as technical manager, afterwards becoming manager of a firm manufacturing patent medicines, and later of several chemical works in London and the provinces.

Mr. Talbot then set up in partnership as a chemical engineer and consulting chemist in London, and this business occupied his attention for some years, involving work for some of the largest chemical manufacturing concerns both at home and abroad. Mr. Talbot relinquished active private practice to take up a position as manager of one of the subsidiary companies of Messrs. Vickers, Ltd., and about two years ago

was invited to join the Welsbach Light Co., Ltd., with which company he is now acting as general manager.

Prior to 1918 Mr. Talbot joined with Professor Hinchley, Wh.Sc., F.I.C., A.R.S.M., of the Imperial College of Science and Technology, South Kensington, London, in laying the foundation of what has since developed into the Chemical Engineering Group, and he has been largely responsible for the progress of that body and for the unique position it enjoys at the present time. He is likewise interested in the movement for the establishment of the Institution of Chemical Engineers. In addition to being a member of the Council of the Society of Chemical Industry and a member of some of the British Engineering Standards Committees, he is a prominent member of the Masonic fraternity.

## Chemical and Drug Exporters' Losses

A MEETING of the creditors of Baiss Brothers and Co., Ltd., wholesale and export chemists and druggists, Grange Road, London, S.E., was held on October 6 at the offices of Edward Moore and Sons, Thames House, Queen Street Place, London, E.C. The chair was occupied by Mr. Ernest Norton, who stated that the company had gone into voluntary liquidation, and he had been appointed to act as liquidator.

The Chairman stated that according to approximate figures which were prepared as at August 31 last, the liabilities of the company totalled £54,093, of which £37,332 was due to unsecured creditors, and £16,761 was the unsecured balance owing to the partly secured creditors. There were also fully secured creditors, and they held securities which would show a surplus of £7,858. The free assets of the company amounted to £26,304, making total assets of £34,162. From the latter figure had to be deducted £595 for preferential claims, leaving net assets of £33,567. In arriving at that figure no value had been placed on the goodwill, which appeared in the last balance sheet at over £28,000. Since his appointment as liquidator he had entered into negotiations which he hoped would result in the sale of the business as a going concern, and something might then be obtained for the goodwill. The liabilities might be increased, and it would be safe to assume that they were £55,000, against net assets of £33,000, or a deficiency of £22,000. The amount which the creditors would ultimately receive depended largely on the manner in which the assets were realised. That remark applied particularly to the stock. The stock which had not been hypothecated in respect of advances amounted to £9,000. It was a very mixed stock, comprising some 2,000 to 3,000 different kind of drugs and chemicals, mostly in small quantities. At a forced sale that stock would not realise anything like £9,000. It was to the best interest of creditors to sell the business as a going concern, and he was continuing the business with that end in view. The present position of the company was due to the following causes:—(a) Heavy falling off in the export sales, particularly in South America, due to the collapse of exchanges and German competition; (b) depreciation in the values of stocks of drugs and chemicals; and (c) loss incurred on export debts.

The representative of the principal trade creditors proposed that the voluntary liquidation of the company should be continued with Mr. Norton as liquidator. He also suggested that the business should be continued and that the liquidator should have power to employ such assistance as he required. After further discussion a resolution for the voluntary liquidation of the company, with Mr. Norton as liquidator, was carried unanimously.

## Separation of Wax from Distillates

MR. L. D. WYANT, chemical engineer, of the U.S.A. Bureau of Mines experimental station at Bartlesville, Oklahoma, is continuing the study of methods of separating wax from Mid-Continent distillates. This is a part of a broader investigation to determine the most efficient methods of preparing lubricating oils from Mid-Continent crudes. Data are being collected on the methods now in use for separating wax from distillates, and a careful study will be made to determine the nature of the wax that is not removed by pressing. The experimental refinery at the Bartlesville station has been enlarged and will be used for the preparation of wax distillates and lubricating oils from different Mid-Continent crudes.

### German Dye Industry

#### Capital Increases in the Aniline Group

In an extract from the *Frankfurter Zeitung* of September 24, forwarded to the Department of Overseas Trade by the Commercial Secretary at Cologne, it is stated that the companies belonging to the Aniline Group have, as briefly announced in THE CHEMICAL AGE last week, unanimously agreed that, in view of present conditions created by the depreciation of the mark, a capital increase is required.

At the next general meeting the board of the Chemische Fabriken vorm. Weiler-Ter-Meer will propose a capital increase in such a way that the original capital will be increased from 33,651,000 mks. to 60 million mks., and the preferential capital from 2,325,000 mks. to 4 million mks. The new shares will be entitled to bear dividend as from January 1, 1922, and will be taken over by a bank at 150 per cent. and offered to the old shareholders in the proportion of 3 to 4 at the same rate.

The board of the Farbwerke vorm. Meister Lucius and Brüning at Höchst a/M decided to propose at the general meeting to be held on October 16 an increase of the capital of 470,000,000 mks. to 940,000,000 mks. by the issue of 440,000,000 mks. ordinary shares and 30,000,000 mks. preference shares. The new shares will be taken over by a banking group at 150 per cent. and offered to the shareholders in the proportion of 1 to 1.

When the general meeting of the Farbenfabriken vorm. Bayer and Co., is held on October 18, the board will propose an increase of the ordinary capital by 440 million to 880 million mks. and of the preferential capital by 30 million to 60 million mks. The new shares will be entitled to bear dividend as from January 1, 1922, taken over by a bank consortium at 150 per cent., and offered to the shareholders in the proportion of 1 to 1.

The Badische Anilin-und Sodafabrik, at Ludwigshaven, proposes the increase of the original capital by 440 million to 880 million mks. and of the preferential capital by 30 million to 60 million mks.; while the A.G. für Anilin-Fabrikation, at Berlin-Treppow, proposes to double both its original and preferential capital. The shareholders will have the right to take up shares in the proportion of 1 to 1 at 150 per cent.

The Chemische Fabrik Griesheim-Elektron, at Frankfurt a/M, proposes the increase of the original share capital by 110 million to 220 million mks. and the preferential share capital by 8 million to 16 million mks. The new shares will be entitled to bear dividend as from January 1, 1922, and offered in the proportion of 1 to 1 at 150 per cent. The Höchst Farbwerke A.G. have decided to propose an increase of their original capital from 440 million to 880 million mks., and of their preferential capital from 30 million to 60 million mks.

A survey of the dividends paid, and the capital increases of the various companies belonging to the Aniline Group during the last few years is given in the following table:—

	Dividends.		Share of profits	
	1920.	1921.	in per cent.	
Höchst .. ..	20	30	24.82	
Bad. An. .. ..	20	30	24.82	
Bayer .. ..	20	30	24.82	
Treptow .. ..	20	30	8.08	
Griesheim .. ..	16	27	6.0	
Weiler .. ..	15	25	1.65	
Cassella .. ..	20	30	9.81	
Total .. ..	—	—	100.00	

INCREASE OF THE ORIGINAL CAPITAL. In million marks.

	Oct., 1919, to		April, 1921, to		Dec., 1921, to		Sept., 1922, to	
	O.Sh.	P.Sh.	O.Sh.	P.Sh.	O.Sh.	P.Sh.	O.Sh.	P.Sh.
Höchst .. ..	180	72	400	30	440	30	880	60
Bad. An. .. ..	180	72	400	30	440	30	880	60
Bayer .. ..	180	72	400	30	440	30	880	60
Treptow .. ..	63	25	136	10	149	10	298	20
Griesheim .. ..	45	18	100	8	110	8	220	16.00
Weiler .. ..	16.64	6.66	31	2.33	33.65	2.33	67.30	4.66
Cassella .. ..	81	32	152.2	—	152.20	—	304.40	—
Total .. ..	745.64	297.66	1619.2	110.33	1764.85	110.33	3529.70	220.66

### Forster's Glass Co.

#### Issue of Debenture Stock Sanctioned

A MEETING of the holders of 7½ per cent. cumulative participating preference shares in Forster's Glass Co., Ltd., held on October 5 at Winchester House, London, E.C., agreed, on a poll, to a resolution authorising an issue of first mortgage debenture stock not exceeding £200,000.

Alderman J. Foster presided, and, in moving the resolution, said that owing to the coal strike of 1921, and the lack of demand, accentuated by imports from the Continent of Europe, regardless of price, the company had made a loss of £52, 62. During the half-year to September 30, 1922, the company had incurred a loss in April from the same causes, but in May and July a profit had been made, and a fourth glass unit had been put into operation during July, with the result that in August and September the April loss had been extinguished, and a profit made which, if maintained, would cover all capital charges and the proposed debenture issue.

In spite of the fact that only half their glass units were at work, the business was in such a position that if the demand continued to improve it would extinguish last year's deficit before long. The saving effected by the use of automatic machinery brought the labour cost to practically pre-war figures, notwithstanding the fact that workmen were being paid about 85 per cent. above pre-war rates. All that the company required was sufficient demand for their products. Trade was quietly improving, and the directors looked forward hopefully to better and more profitable times.

### Sir Joseph Turner on the Dye Position

IN the course of an address on "Dye-making and the Country's Need," delivered at a luncheon of the Huddersfield Rotary Club last week, Sir Joseph Turner, after referring to the difficulties which British dye manufacturers had experienced in connection with the manufacture of intermediates, said he would not deny that a fair amount of progress had been made, but it was absolutely essential that this progress should continue, and that aniline dyestuffs should be manufactured right from the coal-tar to the finished article in this country. It was not so much the bulk of dyestuffs produced as the amount of goods into which the dyestuffs were put that was the matter of great concern. The dyes, amounting to £2,000,000 in value, which were imported into this country were put into goods the amount of which, when manufactured, was about £200,000,000. Out of the goods produced with the dyes in this country about 80 per cent. were exported. It was easy to see, therefore, that if this country were shut off from receiving those dyestuffs the industries of this country would be hampered and that a very large proportion of our exports would be held up.

### The Chemist in the Foundry

IN his presidential address to the Lancashire Branch of the Institution of British Foundrymen, Mr. J. Haigh, of Wakefield, said there had been a remarkable improvement on the purely scientific side of the foundry. Twenty years ago the chemist and the chemical laboratory were regarded as luxuries. That was sometimes the case even now, but more often they were regarded as necessary to the regular and accurate production of castings metallurgically. Increased interest was taken in metal mixing, sands and facings. The laboratory could not tell them all the things they wanted to do, and often did not render them the assistance desired, but in many cases this was due to lack of practical experience on the part of the chemist, or his inability to use the information which the practical man possessed. Gradually, however, both sides were being forced together to co-operate for the common good.

### The Gallic Acid Inquiry

WITH reference to the complaint of the chemical merchants that they had not been notified of the hearing of this case, which was reported in our issue of September 30, p. 452, a letter was subsequently sent to the Referee, Mr. Cyril Atkinson, K.C., by the British Chemical Trade Association, asking to be allowed to give evidence against the application to have gallic acid reinstated in the Board of Trade List. We understand, however, that the Referee, after consideration of the facts, has decided not to reopen the case.

## The Elections and Trade—II.

By Sir Ernest J. P. Benn, Bart.

If the election, as seems likely, comes soon, it will be fought on the question of the Near East, and Mr. Lloyd George's handling of the recent crisis. The mind of the public will be so completely absorbed in the various points of view arising out of this controversy that little attention is likely to be given to all those questions which are of real importance to the material well-being of the people. I make no apology for emphasising material well-being because, after all, that is the special care of the manufacturers and traders for whom I claim some right to speak. I suggested last week a campaign for freedom and economy. The two things go together, the one cannot be secured without the other; each is of equal importance, but I propose to deal this week with the question of freedom only, because traders can claim freedom in the interests of the community at large, while in talking of economy we are always liable to the charge—that we are thinking of our own pockets.

Our aim should be to weaken the mania for managing which has in these latter days gripped mankind. The world is smothered with committees and other bodies, all engaged in preparing some form of management for other people. The mind-power of the whole world is very largely occupied in thinking about the actions of others. That needs to be reversed, and we want to get the individual to think about himself and his responsibilities. Only so can we get the best out of him; the present method brings his worst side uppermost.

### Essentials for Improved Trade

Trade is bad. It is a little better than the worst, but it is still bad, and the way to make it better is not to invent a new sort of management, but to study the present position and to endeavour to discover what is wrong with it. We shall find that most of our difficulties arise from somebody's desire to do good. We are subject to thousands of restrictive arrangements, all of which have been devised with good objects, backed by plausible arguments, and enforced in the name of progress. These things have combined together to make progress impossible, and the present task is to expose their work and prove their futility. The new "liberty movement" will be a negative movement; it will proceed upon the assumption that man is good, and that the wise course is to bring the best out of him.

To make out the case for freedom it is only necessary to set out the present position, to let the public know what is actually happening, to point to the practical difficulties. Suppose we take the case of a company negotiating a contract—it matters not for what—and just set down quite simply and without comment the conditions with which it is faced to-day. For convenience we will divide the difficulties into three classes; one, ordinary risks; two, legislative difficulties; three, political obstacles.

The ordinary difficulties are bad enough, but they are of a kind which cannot be obviated. The contract in question will first of all involve the willingness or the ability of perhaps a hundred other agencies to carry out its various conditions. It will bristle with risks, most of which are outside the control of the contractor; the bankruptcy of suppliers, the non-arrival of material, troubles arising from errors of calculation, and so on and so forth. Then, of course, there is the great big risk of the feasibility of the scheme as a whole; the contract is on paper, and when translated into bricks, or wood, or stone, may assume a totally different character. Equally important is the judgment of the contracting parties on all sides, as to the future state of the market. Prices will be given and accepted, and undertakings entered into which will produce unforeseen results. All these are the ordinary risks of a business transaction, and all require a certain amount of courage, a good deal of confidence, and a measure of ability. They are of themselves sufficient to act as a powerful deterrent to business, and yet business is essential to the life of all of us.

Then we come to the next category, legislative difficulties. To begin with, the contracting parties are each possessed of heavily depleted resources by reason of recent exactions of the tax collector; that, of course, cannot be helped. There is, however, the more serious consideration, that the present

and prospective taxation may very well prove to be considerably more than any profit which can reasonably arise from the projected transaction. Chancellors of the Exchequer talk glibly of 5s. in the £, but traders know to their cost that the £ in question is very seldom a real profit. The contract under discussion may very well land them with a lot of useless buildings and machinery, written back for taxation purposes, and bankruptcy comes all too often that way. If the proposed business involves anything in the nature of building, the parties who have the matter in contemplation will, of course, have to face the terrors which have for long been associated with any attempt to put bricks and mortar together. Innumerable authorities will batten on the business before it can proceed. To this must be added certainly a thousand Acts of Parliament, of which the business people concerned are supposed to have full knowledge, which will hamper and harass them at every turn. If the contract in question depends in any way on foreign materials, or foreign help, then a new set of difficulties arrives on the scene. Supposing America to be interested, the contractors will have to reckon upon a full month for a reply to a letter to New York, thanks to protective arrangements on both sides of the Atlantic. If materials have to come from other parts of the world, then the unfortunate business men involved in this scheme must acquaint themselves with ten thousand tariff schedules, continually changing and chopping about, or else make provision for the heavy risk involved in this department of official activity. They will in addition have to face all the terrors of import and export licenses, not only in this country, but in almost every country in the world.

### The Attitude of Labour

Then we come to what I have called the political difficulties. These are more subtle, and for that reason even more dangerous. The business men contemplating the contract we are discussing will have to face the horrid fact that if they succeed, if their enterprise is rewarded with profit, if they make anything for themselves out of it, the public will sneer and call them profiteers. A greater difficulty still is the mind of the working man. Thirteen years of communistic propaganda have cemented into the brain of the worker a feeling of injustice, which in itself is enough to lead many people to decline to touch prospective business. Then comes the risk of new schemes and new proposals, and before the contract in question is half-way through, it is positively certain that a lot of new legislation, some of it affecting the business in hand, will be rushed on to the Statute Book. The contractors have to be prepared at any moment to face new difficulties ranging from a capital levy to an alteration in the tariff. Added to these, as if they were not enough, there is the common risk of a strike. The wages strike, the strike which is strictly a trade union endeavour to improve conditions, is a business risk which any business man can gauge for himself, but we now have the new strike, the stoppage which is organised for admittedly political purposes only.

All these things are arranged in the name of progress, many of them are supposed to be justified by the fear of unemployment; but surely if the business community were to put their back into the education of the public it would be easy to show how all these things defeat their own object.

In the quite incomplete catalogue which I have attempted above, there is more than enough to explain the whole of the unemployment which exists to-day. A study of the present conditions makes one really wonder that there is any trade at all, and yet, trade goes on, trade is even improving, and trade will get better still. We are entitled as business men to claim enormous credit for surmounting absurd and unnecessary difficulties, and we are entitled to say that if some of these could be removed we could render to the community even greater service than we are giving to-day.

We want a campaign for freedom, for liberty. We want to get the public back to the idea of freedom and liberty, not because it will give us business men a better chance—as patriotic citizens we would gladly submit to any form of legislation or restriction which was for the benefit of the public as a whole—we want liberty because the present state of affairs has been demonstrated to mean a lowering of the standard of life, and because only in the atmosphere of confidence and cheer which comes from liberty can we resume our function of providing for the wants of our fellows, and improve and better the conditions of each and all.

## From Week to Week

PROFESSOR F. T. TROUTON, F.R.S., emeritus professor of physics in the University of London, has died at the age of 58 years.

EXTENSIVE DEPOSITS of kaolin are reported to have been discovered in the chain of mountains running between Balcic and Cavarna, in the Dobrudja.

A FEATURE of the figures relating to the import trade of Shantung Province in 1921 is the rapid increase in imports of German aniline dyes and artificial indigo.

THE STEAUA ROMANA (BRITISH), LTD., are advised that the crude oil production of the Steauna Romana, Bucharest, during the month of September was 21,630 tons.

SIR DUGALD CLERK, F.R.S., and Sir Richard Gregory, editor of *Nature*, were recipients of the honorary degree of Doctor of Science, at Leeds University, on Tuesday.

ONE GRAMME of radium, valued at £20,000, has been purchased by the province of Quebec from the United States Radium Corporation for the treatment of cancer and other diseases.

MR. JOHN DUTHIE, paint manufacturer, died suddenly on Monday, at 181, West Regent Street, Glasgow, in his 50th year. The interment took place at Sighthill Cemetery on Thursday.

MRS. STAFFORD ALLEN, wife of Mr. Stafford Allen, of Allen, Stafford and Sons, Ltd., essential oil distillers and manufacturing chemists, has been appointed Justice of the Peace for the county of Suffolk.

MR. H. H. SISSONS has been appointed chairman of Sissons Brothers and Co., Ltd., Hull. Messrs. O. H. Sissons and T. B. Sissons are now vice-chairmen and governing directors; Messrs. J. A. Dew and G. H. Dawson are joint managing directors; and Mr. A. D. Watson is director and secretary.

THE PRINCE OF WALES has graciously accepted an invitation to be present at a joint dinner of the Institution of Mining Engineers and the Institution of Mining and Metallurgy to be held on Thursday, November 16 next. The dinner will be held at Guildhall by permission of the Corporation of the City of London.

IN CONNECTION with their new method of dealing with the boll weevil in the U.S.A., Smethurst and Meade, Ltd., state that their compound is a fine white powder, which they claim to be superior to calcium arsenate for this purpose as the powder adheres to the plant and can be applied in any weather except a heavy downpour of rain.

MR. A. J. G. SMOUT, A.I.C., the newly elected president of the Birmingham Metallurgical Society, advocated, in his inaugural address last week, as a step towards the elimination of waste, the larger employment of chemists in industry. He deprecated, however, the fact that few employers were willing to pay salaries large enough to attract the chemist.

THE APPOINTMENTS REGISTER COMMITTEE of the Institute of Physics announces its readiness to recommend to public departments, universities and colleges, directors of research, manufacturers, and others desirous of employing or consulting fully qualified physicists, suitable persons possessing special knowledge of any branch of physics.

THE COMMERCIAL SECRETARY, Occupied Territory, Cologne, has forwarded an extract from the *Kölnische Zeitung* which states that the German Cement Syndicate has, with effect from October 1, reduced the price for deliveries of cement to Holland by 1.50 fl. for the Southern districts and by 4 fl. for the Netherland oversea districts in order to meet British competition more keenly.

THE AMERICAN CYANAMID Co. reports that during August there was no production of ammo-phos at the New Jersey plant, operations there still being confined to certain secondary products. At the Niagara Falls plant operations were on the basis of full capacity. At the phosphate mines, Brewster, Florida, mining operations were upon a substantially normal basis. The net value of the shipments of the various products totalled \$575,784.14.

MR. WILFRID HILL, managing director of the County Chemical Co., in a paper read before the Midlands branch of the National Union of Manufacturers at Birmingham, on Monday, said that if the individualistic and competitive system was to survive, it must be defended from the ceaseless attacks of its adversaries. To this end he suggested that every industry should organise itself for defence by main-

taining its own educational propaganda for the vindication of the capitalist system.

IN A HANDBOOK on oxy-acetylene welding, issued by the Air Ministry (H.M. Stationery Office, gd.), it is remarked that though the employment of such welding has become general in the manufacture of various parts used in aircraft construction, the quality of the work in many cases is not of a high order. The reasons why this is so are summarised, and directions are given as to the precautions that must be observed in regard to plant, materials, and manipulation, if good results are to be obtained.

MR. ISAAC GUGGENHEIM, the American "Copper King," died suddenly at Southampton on Tuesday. Born in 1854, he was the eldest of the seven Guggenheim brothers, whose vast interests in copper smelting and kindred activities brought them all large fortunes. The company is said to handle some 500,000 tons of copper annually, and it controls three of the largest copper mines in the world. Mr. Guggenheim was a director of the American Smelting and Refining Co., and vice-president of the United States Zinc Co.

IT IS ANNOUNCED that there is no foundation for the rumour which has gained currency that the Chilean Nitrate Producers' Association is contemplating consignments of nitrate of soda on a considerable scale in the world's consuming markets. The Association neither desires nor intends to make any consignments to countries or centres where there are already adequate facilities for supply, though it may be found necessary to do so where merchants cannot be persuaded to take the risk, as in new markets or those difficult of access.

PROFESSOR R. R. THOMPSON, who has held the office of Director of Lands and Mines in Trinidad, has been appointed the new professor of oil mining at the University of Birmingham. Twelve years ago he was a lecturer on the staff of Sir John Cadman, at the University. The new professor of coal and metal mining is Professor K. N. Moss, until recently assistant professor. Sir John Cadman will continue to act as Honorary Adviser to the University on all mining subjects, and Dr. Haldane as Director of the Coal Mining Research Laboratories.

THE INTERNATIONAL LIQUID FUEL CONGRESS opened on Tuesday at the premises of the International Exhibition, Paris. M. Daniel Berthelot read a paper on the scientific study of carburants, pointing out that if the derivatives of petroleum are to be made full use of they must be studied separately and rationally and not in a haphazard fashion, as is the custom even to-day. In the afternoon the Congress visited the Liquid Fuel Exhibition. Later, the members, led by M. Paul Sabatier, attended a reception given in their honour at the Hôtel de Ville.

FROM the trade statistics of the Straits Settlements it appears that British Malaya is a big importer of cement. This is probably accounted for by the public works now in progress, especially important extensions of the railways. In 1917, 328,000 casks of cement were imported, and in 1918, 385,000 casks. Hongkong, where the Green Island cement works are situated, by its comparative proximity, is placed advantageously over its more distant competitors. There is a local company manufacturing cement in the Federated Malay States—the Batu Caves Cement Works (Selangor); but, strangely enough, its output fell off very considerably last year. The amount manufactured for the past three years was: in 1919, 4,395 tons; in 1920, 5,451 tons, and in 1921, 1,768 tons.

WE REGRET to announce the death, on August 2, at Remuera, New Zealand, of emeritus professor Frederick Douglas Brown, at the age of seventy years. Professor Brown, states *Nature*, began the study of chemistry in 1870, under Dr. Matthiessen, at St. Bartholomew's Hospital. On the death of Dr. Matthiessen, he continued his studies at the Royal College of Science, South Kensington, and afterwards in Leipzig. On his return to England about 1876, he began research work at the London Institution with Professor Armstrong. He then spent some time in Professor Guthrie's laboratory and afterwards in the University Laboratory, Oxford. During this period he was concerned in the teaching of chemistry at Cheltenham and Clifton Colleges and he also supervised the construction of the chemical laboratories in University College, Nottingham. In 1883, Brown was appointed professor of chemistry and physics in Auckland University College, a post he held until 1914.

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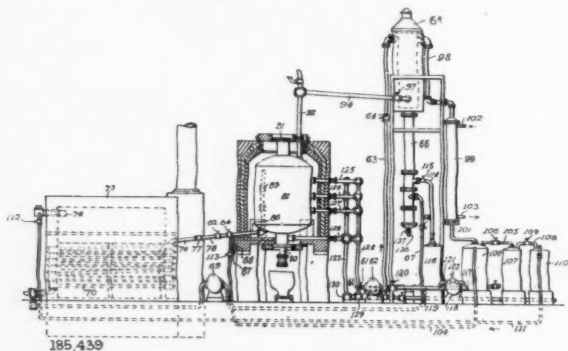
### Abstracts of Complete Specifications

**185,433. CELLULOSE INTENDED FOR THE MANUFACTURE OF VISCOSE, PRELIMINARY TREATMENT OF.** W. Cross, London. From Technochemia Akt.-Ges., Glarus, Switzerland. Application date, March 4, 1921.

Bleached or unbleached sulphite or sodium cellulose is treated for several hours with a dilute mineral acid at a raised temperature. The product requires less carbon disulphide for conversion into a xanthogenate than the same cellulose untreated. The xanthogenate thus obtained is superior in strength and elasticity to that obtained from hydro-cellulose. In an example, the cellulose is heated to 100° C. in water containing 0.5 per cent. of hydrochloric acid, or to 80° C. in water containing 2 per cent. of hydrochloric acid, for 5-6 hours. The temperature is then allowed to fall very slowly to 30° C. In another example, water containing 8 per cent. of sulphuric acid at 40°-50° C. may be used, or 0.2 per cent. sulphuric acid heated in a closed vessel at a pressure of 0.5 kilograms per square centimetre. Under these conditions no hydro-cellulose is formed. With viscose obtained from this cellulose, the usual "ripening" is not necessary.

**185,439. CRACKED PETROLEUM OILS AND PROCESS AND APPARATUS FOR PRODUCING SAME.** L. W. Goold, Birmingham. From Universal Oil Products Co., 208, South La Salle Street, Chicago, U.S.A. Application date, March 11, 1921.

Heavy petroleum is introduced through an inlet pipe 60 to the top of a dephlegmator 65, through which it flows in counter-current to the rising vapour. The crude oil then passes through the extension 66, pipe 67, and pump 69 to the cracking tube 70 mounted in a furnace 73. The cracked oil passes out through a pipe 76 to expansion chambers 81 at a temperature below 875° F. Vapour passes from these chambers through pipes 94 to the dephlegmator. Vapour from the latter passes through pipe 98 to a water-cooled con-

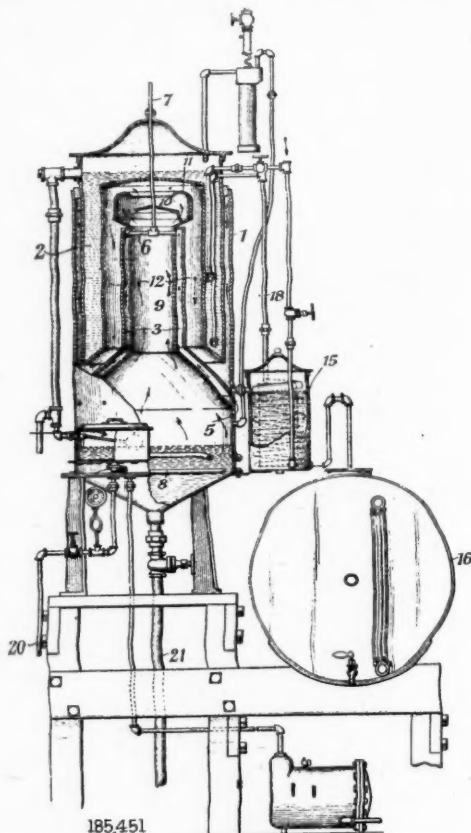


denser 99 and receiver 100. Gas which is not condensed passes through a pipe 104 back to the chamber 81. Alternatively this gas is diverted through a pipe 105 to a tank 107 and gasometer 110 for subsequent use in heating the furnace 73. Part of the raw oil and reflux is drawn off from the dephlegmator by pipe 114 to a cooler 116 and thence through a pipe 117 to the crude oil pipe 163. At the beginning of the operation, heavy residual oil is drawn from the chamber 81 by a pipe 128, and when this pipe becomes clogged with carbon the pipes 127, 126, 125 are used in succession. Two similar chambers 81 are used alternately, so that each of them may be cleaned alternately. The pressure and temperature conditions in the system are such that not less than 45% of the crude oil is converted into pressure distillate of not less than 45° Bé.

**185,451. STILL.** A. C. Jewell, 565, West Van Buren Street, Chicago, U.S.A. Application date, April 28, 1921.

The outer casing 1 contains an annular chamber 2 surrounding an annular vapour chamber 12 which contains an annular air chamber 3 connected at its lower edge to the wall of the still. Air is admitted to the air chamber through openings 5 and may escape from it through pipes 6, 7 at the top. The

wall of the chamber 3 thus forms an air-cooled condensing surface, and the wall of the chamber 2 forms a water cooled condensing surface. The liquid to be distilled is heated in the bottom of the still by means of a pipe coil 8 supplied with steam from the pipe 20 and discharging to the pipe 21, and the vapour passes upwards through a central space 9 to the



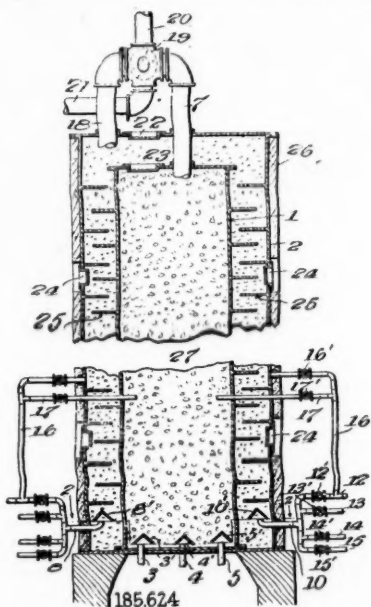
hood 10, which deflects it outwards, and thence to the hood 11, which deflects it inwards. The vapour then passes downwards through the chamber 12, where it is condensed in contact with the air- and water-cooled walls. The condensed liquid then passes through the cooling coil 15. Cooling water from this cooler is passed through the pipe 18 to the annular water chamber 2, and water may also be supplied directly to the latter through the pipe 17. The distillate is finally collected in the tank 16.

**185,612. NEW TRIARYL-METHANE COLOURING MATTERS, MANUFACTURE OF.** British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London, W.C.2, A. G. Green, K. H. Saunders, and S. C. Bate, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, August 17, 1921.

The process is for producing colouring matters of the triaryl-methane class containing oxyalkyl groups attached to nitrogen. Tetramethyl-diamino-diphenyl ketone (Michlers' ketone) is condensed with an oxyalkyl arylamine, a dioxyalkyl arylamine, an oxyalkyl-alkyl-arylamine or an oxyalkyl-aralkyl-arylamine in the presence of phosphorus oxychloride. As example of these classes, oxyethyl-aniline, dioxyethyl-aniline, oxyethyl-ortho-toluidine, and oxyethyl- $\alpha$ -naphthylamine are given. In another method tetramethyl-diamino-diphenyl-carbinol (Michlers' hydrol) is condensed with the substances above mentioned. The leuco compound obtained is oxidised to the colouring matter in the usual manner. The dyestuffs obtained are blue and purple respectively.

185,624. OIL CRACKING PROCESS AND APPARATUS THEREFOR. C. A. Jensen, London. From J. A. Stone, 702, 10th Street, N.W., Washington, D.C., U.S.A. Application date, August 27, 1921.

In this apparatus for cracking oil, the retort is automatically freed from carbon deposits, and the latter are burned to assist in the cracking process. The periodical closing down of the apparatus for cleaning purposes is thus avoided. A vertical cylinder 1 is surrounded by a cylinder 2 of such a size that the volume of the inner cylinder is equal to that of the annular space. Baffle plates 25 are arranged between the cylinders to support magnesite or other non-conducting material, and the cylinder 1 contains a catalyst, absorbent, or spreading material 27, such as cast iron or nickel, or refractory material such as fireclay, firebrick, or fullers' earth. Gas and air are admitted from the pipes 14, 15 to burners 8<sup>1</sup>, 10<sup>1</sup>, and the combustion gases heat the material on the plates 25 so that the heat is conducted into the inner chamber. The hot gases are drawn



off through the pipe 18, four-way valve 19, and pipe 20. Oil is then passed into the central chamber by pipes 3, 4, 5 at the bottom or 17 at the middle. The oil is cracked within the material 27 which retains the heavier hydrocarbons, tarry material and carbon. The oil vapour passes by pipe 7, valve 19, and pipe 21, to a condenser. When the deposit of carbon on the material 27 becomes too great, the process is reversed, and burners at the bottom of the chamber 1 are started, while oil is admitted to the annular space, and excess of air is admitted to the chamber 1 to burn out the carbon. Heat is now radiated outwards into the annular space which now becomes the retort, while the four-way valve 19 is reversed. The process may therefore be made continuous.

185,684. LOW TEMPERATURE CARBONISATION, SYSTEM OF. J. A. Yeadon, 4, Albion Place, Leeds. Application date, December 5, 1921.

The process is for distilling coal at a low temperature in a continuous manner to produce a uniform quality of distillation products. The process is applicable to any bituminous coal, lignite, cannel or similar material. The temperature employed within the retort varies from 400° C. to 700° C. according to the nature of the coal and the by-products required. The coal is crushed to a fine powder and delivered from a hopper through a feed cylinder containing a conveyor, to the top of the retort. The feed cylinder is heated by waste gases from the retort, or by a steam jacket to preheat the coal. A rotating distributing device is arranged just within the retort to distribute the coal so that it falls in a fine shower through the retort. The retort is of narrow oblong section so that the descending coal is close to the

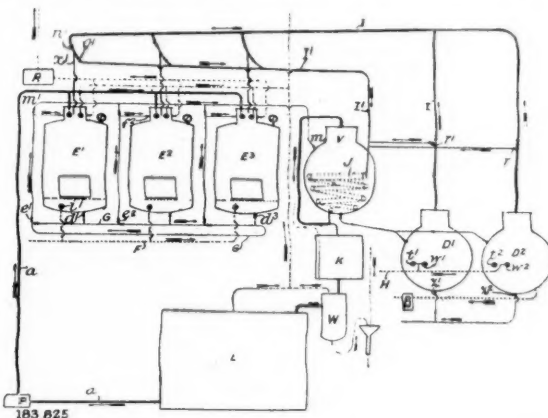
heated walls. These walls are vertically corrugated to give a larger heat radiating surface, as described in Specification No. 127,986 (see THE CHEMICAL AGE, Vol. I, p. 143). The finely-divided coke discharged at the bottom of the still contains some volatile matter and is suitable for conversion into smokeless fuel. This process enables small coal to be subjected to low temperature carbonisation.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 165,722 (Aktiebolaget Cellulosa) relating to the evaporation and dry distillation of waste liquors from pulp mills and similar liquors, see Vol. V, p. 286; 167,781 (Farbwerke vorm. Meister Lucius and Bruning), relating to manufacture of aliphatic dialkylaminoalkyl compounds, see Vol. V, p. 464.

### International Specifications not yet Accepted

183,825. EXTRACTING FATTY OILS. S. Zipser, 26, Laudon-gasse, Vienna. International Convention date, July 27, 1921.

The substance to be treated is placed in three extractors, E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, which are then closed and exhausted by a pump R. The solvent is forced from a reservoir L through a pipe a to the extractor E<sup>1</sup> through which it passes. Fresh solvent is then admitted to the extractor E<sup>1</sup>, and displaces the partly used solvent through a valve d<sup>1</sup>, pipe G and valves e<sup>2</sup>, f<sup>2</sup> into the chamber E<sup>2</sup>. The solvent then passes in a similar manner to the extractor E<sup>3</sup>. When the material in the chamber E<sup>1</sup> is spent, the solvent is forced into the extractor E<sup>2</sup> by vapour from the stills D<sup>1</sup>, D<sup>2</sup> which is admitted through the pipe I and valve n<sup>1</sup>. The solvent passes into



is raised to 50°-120° C., the pressure being also increased. The final product may be treated under heat and pressure with hexamethylenetetramine to render it infusible and insoluble.

- 184,184. ACETYLENE. Consortium für Elektrochemische Industrie Ges., 20, Zielstattstrasse, Munich, Germany. International Convention date, August 1, 1921.

To remove phosphorus compounds from acetylene, the gas is mixed with a small proportion of oxygen or air and passed through a reaction tower containing activated charcoal, heated to 80°-100° C., or the air and acetylene may be passed in succession through the tower. The phosphorus compounds are oxidised to phosphoric acid and extracted from the charcoal with hot water.

- 184,193. DYES AND INTERMEDIATES. Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. International Convention date, August 4, 1921.

The object is to obtain a blue vat-dyestuff by alkali fusion of  $\beta$ -aminoanthraquinone, which will be fast to chlorine and hypochlorites. Commercial  $\beta$ -anthraquinone is dissolved in concentrated sulphuric acid and then diluted with water or dilute acid, which precipitates the sulphate but not the impurities which yield products not fast to chlorine. These impurities may alternatively be dissolved out by treating the crude amine with weak acid. Alternatively the crude amine may be fused with alkali at a higher temperature or for a longer time, or with oxidising agents, to destroy the impurities not fast to chlorine. In another alternative, the dyestuff, prepared as usual, is dissolved in sulphuric acid and diluted to precipitate the dyestuff but not the impurities.

- 184,442. SYNTHETIC RESINS. Consortium für Elektrochemische Industrie Ges., 20, Zielstattstrasse, Munich, Germany. International Convention date, August 12, 1921.

Resins obtained by condensation or polymerisation of aldehydes, such as acetaldehyde with alkali, are ground in a ball mill with acetic acid of 3 per cent. strength. The product is stable towards water and may be dissolved in fatty oil, spirit, benzene, or other solvent for the manufacture of varnish.

- 184,451. DRY DISTILLATION OF COAL, ETC. K. B. Quinan, Somerset West, Cape of Good Hope, South Africa. International Convention date, August 6, 1921.

Hot gases are forced by a fan through a superheater to a retort containing coal, shale or wood, and then pass to a condenser, where the volatile products of distillation are condensed. The gas then passes back to the fan in a closed cycle.

- 184,473. PURIFYING LIQUIDS. J. N. A. Sauer, 43, Johannes Verhulst-straat, Amsterdam. International Convention date, August 9, 1921.

The process is for purifying liquids such as sugar and glucose syrups, mineral oils and greases, benzene, spirits, water, alcohol, or glycerine. The liquid is treated with a precipitated compound such as calcium phosphate, which removes calcium compounds and phosphates, or calcium carbonate, which removes calcium compounds and organic compounds. The precipitates are more effective in removing substances which are chemically similar to them. The precipitates may be regenerated after use by dissolving and reprecipitating, or by ignition and washing with dilute acid or alkali. When treating sugar solutions the treatment may be combined with other processes such as treating with sulphurous acid or decolorising carbon.

#### LATEST NOTIFICATIONS.

- 186,572. Process for the manufacture of butyric acid with recovery of the gases of fermentation. Lefranc et Cie. September 26, 1921.  
186,589. Process and apparatus for the electrolysis of zinciferous materials. Hansgig, Dr. F. September 30, 1921.  
186,606. Purification of hydrofluoric acid. Howard, H. September 29, 1921.  
186,616. Process for distilling tars. Duplan, F. September 29, 1921.

#### Specifications Accepted, with Date of Application

- 159,895. Sodium bicarbonate, Production of. Nitrogen Corporation. March 11, 1920.  
160,776. Wood, Method of converting into sugar and other products. S. F. Acree. March 25, 1920.

- 160,777. Wood, Methods of converting into mucic acid and other products. S. F. Acree. March 25, 1920.  
161,564. Cellulose esters, Production of. A. D. Little, Inc. April 10, 1920.  
165,408. Artificial resins, Process for the production of. R. Pummerer. June 25, 1920.  
165,439. Cellulose ester compositions. E. I. Du Pont de Nemours and Co. June 19, 1920.  
165,728. Crotonic acid from croton aldehyde. Elektrizitätswerk Lonza. July 2, 1920.  
166,530. Mordant dyeing colouring matters, Manufacture and production of. Durand and Huguenin Soc. Anon. July 15, 1920.  
169,687. Brown dyestuffs. Soc. Chimique de la Grande Paroisse. September 30, 1920.  
174,046. Electrically precipitating suspended particles from fluids, Apparatus for. Siemens-Schückertwerke Ges. January 14, 1921.  
182,820. Cellulose derivative and process of preparing same. A. D. Little, Inc. April 10, 1920.  
186,020. Solution of cyanamide from calcium cyanamide, Method and apparatus for producing. Wargons Aktiebolag, and J. H. Lidholm. December 1, 1921.  
186,107. Resins, Manufacture of. O. Y. Imray. (Soc. of Chemical Industry in Basle). June 9, 1921.  
186,114. White lead, Manufacture of. A. E. White (National Lead Co.). June 14, 1921.  
186,139. Glucose and dextrin from wood, Process of and apparatus for obtaining. H. Terrisse and M. Levy. June 20, 1921.  
Addition to 143,212.  
186,162. Ore crusher. B. A. Mitchell. June 22, 1921.  
186,199. Alkali from feldspar and other minerals containing alkali, Process for the extraction of. Plauson's (Parent Co.), Ltd. (H. Plauson). July 15, 1921.  
186,202. Thymol, Manufacture and production of. J. Y. Johnson. (Badische Anilin und Soda Fabrik.) July 18, 1921.  
186,223. Phosphorus compounds suitable for manurial purposes, Process for the treatment of. R. W. James. (Eisenwerkges. Maximilian-shutte). August 9, 1921.  
186,262. Gas producers. W. Climie. June 15, 1921.  
186,270. Chlorination of methane. Holzverkohlungs-Industrie Akt.-Ges. and K. Roka. November 22, 1921.

#### Applications for Patents

- Benoit, A. L. Purification of liquids. 26652. October 3.  
Clarke, H. B. R., Roberts, T. H., and Skellon, H. Vulcanisation of rubber. 27114. October 6.  
Coke and Gas Ovens, Ltd., and Smith, T. B. Method of producing white commercial pure ammonia chloride. 26967. October 5.  
Dreyfus, H. Production of products from alkali compounds. 26959. October 5.  
Dreyfus, H. Manufacture of products from cellulose derivatives. 27083. October 6.  
Engelhardt, A., and Farbenfabriken vorm. F. Bayer & Co. Process for separating or isolating organic gases or vapours of organic products. 26841. October 4.  
Grieve, E. J. Gas-producer plants. 26783. October 4.  
Harding, L., and Whetham, W. C. D. Manufacture of lactose and/or lact-albumen. 26879. October 5.  
Harrington, O. Deodorisers or disinfectants. 26801. October 4.  
Holzverkohlungs-Industrie Akt.-Ges. Process for chlorination of methone. 27107. October 6. (Germany, March 27.)  
Hovey, E. L., and Hovey, R. B. Nitrate of lime. 26883. October 5.  
Howard, H. Process for production of hydrogen sulphide. 26739. October 3. (United States, October 20, 1921.)  
Jackson, W. J. Mellersh-, and Koppers Co. Removal of hydrogen sulphite from gases. 26715. October 3.  
Jackson, W. J. Mellersh-, and Koppers Co. Manufacture of hydrogen sulphide. 26722. October 3.  
Jones, F. J. C. Distillation of zinc, etc., by electrical means. 27006. October 6.  
Koppers Co. Removing hydrogen sulphide from gases, etc. 26701, 26702. October 3. (United States, December 8, 1921.)  
Koppers Co. Purifying gases. 26708, 26730. October 3. (United States, December 8, 1921.)  
Koppers Co. Manufacture of hydrogen sulphide. 26721. October 3. (United States, December 8, 1921.)  
Lynn, A. H. Method of preventing formation of scale in boilers, evaporators, etc. 26867. October 4.  
McMullen, W., and Rickets, W. J. Electrical systems and apparatus for chemical treatment of non-conducting liquids. 26692. October 3.  
Masson, R. D. Purification of oils. 27170. October 7.  
Mitchell, F. G. Superphosphate den excavators. 26606. October 2.  
Moeller, J. Drying and use of peat, etc. 26897. October 5.  
Ward, J. F. Desulphurisation of oils. 26861. October 4.

## Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

LONDON, OCTOBER 12, 1922.

THERE has been considerable activity during the past week, and the turnover has reached fair proportions. Prices of most products remain on the up-grade.

Export demand continues quiet in most lines although there are a few bright spots.

### General Chemicals

ACETONE is particularly short for both spot and forward delivery. Makers are not offering.

ACID ACETIC is again firmer in price, and a further advance is not unlikely.

ACID CITRIC is lower, with little business passing.

ACID FORMIC is a rather better market, and the second-hand parcels which were such a disturbing influence seem to have been absorbed.

ACID LACTIC is unchanged.

ACID TARTARIC.—The price seems to have found its level, but the demand remains very slow.

BARIUM CHLORIDE is without special feature.

COPPER SULPHATE remains unchanged.

CREAM OF TARTAR is in good demand, and the price is firm.

FORMALDEHYDE is higher, and with the advance in raw materials the improvement is likely to continue.

IRON SULPHATE is unchanged.

LEAD ACETATE is dearer and a fair business is reported.

LEAD NITRATE remains unchanged.

LIME ACETATE.—Nothing obtainable below makers' prices, and there is talk of a further advance.

LITHOPONE is in fair request at recent values.

METHYL ALCOHOL has advanced in price.

POTASSIUM CARBONATE is in limited demand. Price unchanged.

POTASSIUM CAUSTIC is slow of sale.

POTASSIUM CHLORATE.—A fair turnover is indicated. Stocks are firmly held.

SODIUM ACETATE is very scarce in all positions, and higher prices are likely.

SODIUM NITRITE.—There is an improvement in price, and the turnover is maintained.

SODA PRUSSIAN is still scarce and firm.

ZINC OXIDE is dearer and supplies are short.

### Coal Tar Intermediates

Business continues to progress on quiet lines, but colour manufacturers are showing increased interest in a few materials.

ALPHANAPHTHOL is not a special feature.

ALPHANAPHTHYLAMINE has been inquired for, but is the turn weaker.

ANILINE OIL has been reduced slightly and is passing regularly into consumption.

ANILINE SALT.—Some small export inquiry.

BENZIDINE BASE.—A home trade inquiry with some odd lots in the market.

BETANAPHTHOL.—Spot stocks are rather short, and some orders are being placed.

DIETHYLANILINE.—Some home inquiry.

DINITROPHENOL.—A certain amount of home business is passing.

"G" SALT.—Home inquiry.

NAPHTHIONIC ACID is steady in price and has been moderately in demand.

NITROBENZOL is without change.

PARANITRANILINE.—A certain amount of home business is passing.

PARAPHENYLENEDIAMINE has been inquired for.

TOLIDINE BASE.—A fair inquiry has been received.

XYLIDINE has been moderately interesting on home account.

### Coal Tar Products

There is no change in the tone of the market, which remains very firm for some products, while others show considerable irregularity.

90's BENZOL.—To-day's quotation is 1s. 9d. to 1s. 10d. per gallon in the North, and 2s. to 2s. 1d. per gallon in London.

PURE BENZOL.—The demand is slow, and the value at present is not over 2s. 2d. per gallon at works in the North.

CREOSOTE OIL.—The demand remains good, and 6d. per gallon on rails at works has been paid in the North, with sellers at 7d. per gallon in the South.

CRESYLIC ACID.—There is no change in the quotations, but the market has not recovered from the effect of the duty put on in America, and it is not easy to state a value. There are sellers of pale, 97/99% quality at 2s. 4d. per gallon; and dark, 95/97%, at 2s. to 2s. 2d. per gallon.

SOLVENT NAPHTHA.—There is rather more inquiry, and prices are fairly well maintained, in spite of the decline in the price of benzol.

HEAVY NAPHTHA is quiet, with sellers at 1s. 6d. per gallon at works.

NAPHTHALENE.—Some transactions have taken place in crude, pressed and whizzed, the price being about £6 15s. to £7 per ton, f.o.b.

PITCH.—There is still a great scarcity of prompt parcels, and high prices are being paid for immediate delivery. To-day's quotations are 97s. 6d. to 100s., f.o.b. East Coast, and 95s. to 97s. 6d., f.o.b. West Coast for October/December, with rather sellers than buyers at these prices for delivery in the spring.

### Sulphate of Ammonia

There is no change in the position.

### Current Prices

#### Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride.....	lb.	0	1	8	to	0	1	10
Acetone oil.....	ton	80	0	0	to	82	10	0
Acetone, pure.....	ton	122	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%.....	ton	67	0	0	to	68	0	0
Acetic, 80% pure.....	ton	43	0	0	to	44	0	0
Arsenic, liquid, 2000 s.g.....	ton	67	0	0	to	70	0	0
Boric, cryst.....	ton	60	0	0	to	65	0	0
Carbolic, cryst. 39-40%.....	lb.	0	0	6½	to	0	0	6½
Citric.....	lb.	0	1	10	to	0	2	0
Formic, 80%.....	ton	57	10	0	to	58	0	0
Gallic, pure.....	lb.	0	2	11	to	0	3	0
Hydrofluoric.....	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.....	ton	40	0	0	to	43	0	0
Lactic, 60 vol.....	ton	43	0	0	to	44	0	0
Nitric, 80 Tw.....	ton	30	0	0	to	31	0	0
Oxalic.....	lb.	0	0	7½	to	0	0	8
Phosphoric, 1.5.....	ton	38	0	0	to	40	0	0
Pyrogallie, cryst.....	lb.	0	5	9	to	0	6	0
Salicylic, Technical.....	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.....	lb.	0	1	5	to	0	1	6
Sulphuric, 92-93%.....	ton	7	10	0	to	8	0	0
Tannic, commercial.....	lb.	0	2	3	to	0	2	9
Tartaric.....	lb.	0	1	3	to	0	1	3½
Alum, lump.....	ton	10	0	0	to	10	10	0
Alum, chrome.....	ton	28	0	0	to	29	0	0
Alumino ferric.....	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14-15%.....	ton	10	10	0	to	11	0	0
Aluminium, sulphate, 17-18%.....	ton	11	10	0	to	12	0	0
Ammonia, anhydrous.....	lb.	0	1	8	to	0	1	9
Ammonia, .880.....	ton	33	0	0	to	35	0	0
Ammonia, .920.....	ton	21	0	0	to	23	0	0
Ammonia, carbonate.....	lb.	0	0	4	to	0	0	4½
Ammonia, chloride.....	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers).....	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure).....	ton	35	0	0	to	40	0	0
Ammonia, phosphate.....	ton	70	0	0	to	72	0	0

	Per	£	s.	d.	£	s.	d.	
Ammonia, sulphocyanide.....	lb.	0	1	10	to	0	2	0
Amyl acetate.....	ton	175	0	0	to	185	0	0
Arsenic, white, powdered.....	ton	46	0	0	to	47	0	0
Barium, carbonate, 92-94%.....	ton	15	0	0	to	16	0	0
Barium, Chlorate.....	ton	65	0	0	to	70	0	0
Barium Chloride.....	ton	22	0	0	to	22	10	0
Nitrate.....	ton	27	10	0	to	30	0	0
Sulphate, blanc fixe, dry.....	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp.....	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%.....	lb.	0	1	0	to	0	1	3
Bleaching powder, 35-37%.....	ton	12	0	0	to	—	—	—
Borax crystals.....	ton	29	0	0	to	33	0	0
Caffeine.....	lb.	0	13	6	to	0	14	6
Calcium acetate, Brown.....	ton	10	10	0	to	11	10	0
" Grey.....	ton	15	10	0	to	16	0	0
Calcium Carbide.....	ton	16	0	0	to	17	0	0
Chloride.....	ton	6	0	0	to	—	—	—
Carbon bisulphide.....	ton	50	0	0	to	52	0	0
Casein technical.....	ton	47	0	0	to	55	0	0
Cerium oxalate.....	lb.	0	4	6	to	0	4	9
Chromium acetate.....	lb.	0	1	1	to	0	1	3
Cobalt acetate.....	lb.	0	6	0	to	0	6	6
Oxide, black.....	lb.	0	9	6	to	0	10	0
Copper chloride.....	lb.	0	1	2	to	0	1	3
Sulphate.....	ton	26	10	0	to	27	0	0
Cream Tartar, 98-100%.....	ton	105	0	0	to	106	10	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde, 40% vol.....	ton	74	0	0	to	76	0	0
Formusol (Rongalite).....	lb.	0	2	6	to	0	2	9
Glauber salts, commercial.....	ton	5	0	0	to	5	10	0
Glycerine, crude.....	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.....	gal.	0	2	5	to	0	2	6
Iron perchloride.....	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas).....	ton	4	0	0	to	4	5	0
Lead acetate, white.....	ton	41	0	0	to	42	0	0
Carbonate (White Lead).....	ton	42	0	0	to	47	0	0
Nitrate.....	ton	44	10	0	to	45	0	0
Litharge.....	ton	35	10	0	to	36	0	0
Lithopone, 30%.....	ton	23	10	0	to	24	0	0
Magnesium chloride.....	ton	7	0	0	to	7	10	0
Carbonate, light.....	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts com- mercial).....	ton	8	0	0	to	8	10	0
Sulphate (Druggists').....	ton	13	10	0	to	14	10	0
Manganese, Borate, commercial.....	ton	65	0	0	to	75	0	0
Sulphate.....	ton	60	0	0	to	62	0	0
Methyl acetone.....	ton	70	0	0	to	75	0	0
Alcohol, 1% acetone.....	ton	70	10	0	to	75	0	0
Nickel sulphate, single salt.....	ton	49	0	0	to	51	0	0
Ammonium sulphate, double salt.....	ton	51	0	0	to	52	0	0
Potash, Caustic.....	ton	33	0	0	to	34	0	0
Potassium bichromate.....	lb.	0	0	6 1/2	to	—	—	—
Carbonate, 90%.....	ton	31	0	0	to	33	0	0
Chloride, 80%.....	ton	12	0	0	to	12	10	0
Chlorate.....	lb.	0	0	4 1/2	to	0	0	5
Metabisulphite, 50-52%.....	ton	84	0	0	to	90	0	0
Nitrate, refined.....	ton	45	0	0	to	47	0	0
Permanganate.....	lb.	0	0	8 1/2	to	0	0	9 1/2
Prussiate, red.....	lb.	0	4	6	to	0	4	9
Prussiate, yellow.....	lb.	0	1	7	to	0	1	8
Sulphate, 90%.....	ton	13	0	0	to	13	10	0
Salammoniac, firsts.....	cwt.	3	3	0	to	—	—	—
Seconds.....	cwt.	3	0	0	to	—	—	—
Sodium acetate.....	ton	24	10	0	to	24	15	0
Arseniate, 45%.....	ton	45	0	0	to	48	0	0
Bicarbonate.....	ton	10	10	0	to	11	0	0
Bichromate.....	lb.	0	0	5 1/2	to	—	—	—
Bisulphite 60-62%.....	ton	23	0	0	to	24	0	0
Chlorate.....	lb.	0	0	3 1/2	to	0	0	4
Caustic, 70%.....	ton	20	10	0	to	21	0	0
Caustic, 76%.....	ton	21	10	0	to	22	10	0
Hydrosulphite, powder, 85%.....	lb.	0	1	9	to	0	2	0
Hyposulphite, commercial.....	ton	12	10	0	to	13	10	0
Nitrite, 96-98%.....	ton	29	10	0	to	30	0	0
Phosphate, crystal.....	ton	16	10	0	to	17	0	0
Perborate.....	lb.	0	0	11	to	0	1	0
Prussiate.....	lb.	0	0	11 1/2	to	0	1	0
Sulphide, crystals.....	ton	12	10	0	to	13	10	0
Sulphide, solid, 60-62%.....	ton	21	10	0	to	23	10	0
Sulphite, cryst.....	ton	12	10	0	to	13	0	0
Strontium carbonate.....	ton	55	0	0	to	60	0	0
Strontium Nitrate.....	ton	50	0	0	to	55	0	0
Strontium Sulphate, white.....	ton	6	10	0	to	7	10	0
Sulphur chloride.....	ton	25	0	0	to	27	10	0
Sulphur, Flowers.....	ton	13	0	0	to	14	0	0
Roll.....	ton	13	0	0	to	14	0	0
Tartar emetic.....	lb.	0	1	4	to	0	1	5
Theobromine.....	lb.	0	12	6	to	0	13	0

	Per	£	s.	d.		£	s.	d.
Tin perchloride, 33%.....	lb.	0	1	2	to	0	1	4
Perchloride, solid.....	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals).....	lb.	0	1	5	to	0	1	6
Zinc chloride 102° Tw.....	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%.....	ton	25	0	0	to	30	0	0
Oxide, 99%.....	ton	37	0	0	to	38	0	0
Dust, 90%.....	ton	45	0	0	to	47	10	0
Sulphate.....	ton	18	10	0	to	19	10	0

## Coal Tar Intermediates, &amp;c.

Alphanaphthol, crude.....	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined.....	lb.	0	3	0	to	0	3	3
Alphanaphthylamine.....	lb.	0	2	0	to	0	2	1
Aniline oil, drums extra.....	lb.	0	1	0	to	0	1	1
Aniline salts.....	lb.	0	1	0	to	0	1	1
Anthracene, 40-50%.....	unit	0	0	8 1/2	to	0	0	9
Benzaldehyde (free of chlorine).....	lb.	0	3	6	to	0	4	0
Benidine, base.....	lb.	0	5	3	to	0	5	6
Benidine, sulphate.....	lb.	0	5	3	to	0	5	6
Benzoic acid.....	lb.	0	1	9	to	0	1	1
Benzoate of soda.....	lb.	0	1	9	to	0	2	0
Benzyl chloride, technical.....	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate.....	lb.	0	4	9	to	0	5	0
Betanaphthol.....	lb.	0	1	4	to	0	1	4 1/2
Betanaphthylamine, technical.....	lb.	0	5	0	to	0	5	0
Croceine Acid, 100% basis.....	lb.	0	3	6	to	0	3	9
Dichlorobenzol.....	lb.	0	0	9	to	0	0	10
Diethylaniline.....	lb.	0	2	9	to	0	3	0
Dinitrobenzol.....	lb.	0	1	3	to	0	1	4
Dinitrochlorobenzol.....	lb.	0	0	11	to	0	1	0
Dinitronaphthalene.....	lb.	0	1	4	to	0	1	5
Dinitrotoluol.....	lb.	0	1	5	to	0	1	6
Dinitrophenol.....	lb.	0	1	9	to	0	2	0
Dimethylaniline.....	lb.	0	2	6	to	0	2	9
Diphenylamine.....	lb.	0	4	3	to	0	4	6
H-Acid.....	lb.	0	6	3	to	0	6	9
Metaphenylenediamine.....	lb.	0	4	9	to	0	5	3
Monochlorobenzol.....	lb.	0	0	10	to	0	1	0
Metanilic Acid.....	lb.	0	6	0	to	0	6	6 1/2
Metatoluylenediamine.....	lb.	0	4	6	to	0	4	9
Monosulphonic Acid (2.7).....	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude.....	lb.	0	3	0	to	0	3	3
Naphthionate of Soda.....	lb.	0	3	0	to	0	3	3
Naphthylamin-di-sulphonic-acid.....	lb.	0	4	0	to	0	4	3
Neville Winther Acid.....	lb.	0	7	9	to	0	8	0
Nitrobenzol.....	lb.	0	0	9	to	0	0	9 1/2
Nitronaphthalene.....	lb.	0	1	3	to	0	1	4
Nitrotoluol.....	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base.....	lb.	0	12	0	to	0	12	6
Orthodichlorobenzol.....	lb.	0	1	0	to	0	1	1
Orthotoluidine.....	lb.	0	1	6	to	0	1	9
Orthonitrotoluol.....	lb.	0	0	8	to	0	0	10
Para-amidophenol, base.....	lb.	0	9	0	to	0	9	6
Para-amidophenol, hydrochlor.....	lb.	0	8	6	to	0	9	0
Paradichlorobenzol.....	lb.	0	0	6	to	0	0	7
Paranitraniline.....	lb.	0	3	6	to	0	3	9
Paranitrophenol.....	lb.	0	2	3	to	0	2	6
Paranitrotoluol.....	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled.....	lb.	0	10	6	to	0	10	9
Paratoluidine.....	lb.	0	6	0	to	0	6	6
Phthalic anhydride.....	lb.	0	2	9	to	0	3	0
Resorcin, technical.....	lb.	0	4	6	to	0	5	0
Resorcin, pure.....	lb.	0	6	9	to	0	7	0
Salol.....	lb.	0	2	0	to	0	2	3
Sulphanilic acid, crude.....	lb.	0	1	0	to	0	1	1
Tolidine, base.....	lb.	0	6	6	to	0	7	0
Tolidine, mixture.....	lb.	0	2	6	to	0	2	9

## The Chemical Constitution of Coal

At the general meeting of the South Wales Institute of Engineers, Dr. Roy Illingworth read a paper on "Some Economic Aspects of the Chemical Constitution of Coal," in which he submitted that from a knowledge of the constitution of coal, any type of a solid, liquid, or gaseous fuel could be produced. Emphasising the need of research, he thought every coalfield should have a research station as an integral part of its endeavour; moreover, correlation of research stations must be a *sine qua non*. Referring to the Government Fuel Research Station, on which last year we spent over £43,000, the author pointed out that over £1,000,000 was spent annually in the U.S.A. on fuel research. On its present basis of finance, he continued, the Fuel Research Station could cover the whole of our coal problems. We needed research into constitution, and this to be correlated with behaviour.

## Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

GLASGOW, OCTOBER 11, 1922.

THE amount of business transacted during the past week, while not large, nevertheless showed signs of improvement. Values generally are steady, with the exception of acetone and acetic acid, which continue to advance.

### Industrial Chemicals

ACID, ACETIC.—Glacial, 98/100%, £60 to £67 according to quantity; 80% technical, £39 to £41; 80% pure, £44 to £45 per ton.  
 ACID, BORACIC.—Unchanged; crystal or granulated £60 per ton; powdered, £62 per ton.  
 ACID, CITRIC.—Quoted 2s. 2d. to 2s. 3d. per lb.  
 ACID, HYDROCHLORIC.—Makers' price unchanged; 6s. 6d. per carboy, ex works. Demand poor.  
 ACID, NITRIC, 80%.—Price about £27 to £28 per ton, ex station, carboys extra.  
 ACID, OXALIC.—Offered from Continent at 6½d. per lb., duty paid.  
 ACID, SULPHURIC.—144°. £4 per ton; 168°, £7 5s. per ton; de-arsenicated quality, £1 per ton more.  
 ACID, TARTARIC.—Offered at 1s. 4d. per lb., delivered.  
 ALUM, LUMP POTASH.—Quoted £15 10s. per ton, spot delivery. Continental offers of £9 10s. per ton, c.i.f. U.K.  
 ALUMINA SULPHATE.—14/15%, £8 per ton; 17/18%, £10 12s. 6d. per ton; c.i.f. U.K. prompt.  
 AMMONIA, ANHYDROUS.—Quoted 13s. 8½d. per ton, ex works.  
 AMMONIA CARBONATE.—Remains unchanged; 4d. per lb. for lump, 4½d. for ground.  
 AMMONIA LIQUID, 880°.—Price about 3½d. per lb.  
 AMMONIA, MURIATE.—Galvanisers, grey about £26 per ton, c.i.f. U.K.; fine white, £24 per ton, c.i.f. U.K.  
 AMMONIA, SULPHATE.—25¼%, £14 15s. per ton; 25½% neutral, £15 18s. per ton, ex works, October delivery.  
 ARSENIC, WHITE POWDERED.—Supplies scarce for immediate delivery. Quoted £48 to £49 per ton.  
 BARIUM CARBONATE, 98/100%.—Offered from Continent at £14 per ton, c.i.f. U.K.  
 BARIUM CHLORIDE, 98/100%.—About £20 per ton, ex wharf.  
 BARYTES.—In moderate demand. Finest white, £5 5s. per ton, ex English works; grey from £3 17s. 6d. per ton.  
 BLEACHING POWDER.—No change in price, £12 15s. per ton, ex station.  
 BORAX.—Crystal or granulated, £29 per ton; powdered, £30 per ton, cart. paid.  
 CALCIUM CHLORIDE.—English makers' price, £6 per ton, ex quay. Continental at £4 10s. per ton, c.i.f. U.K.  
 COPPER SULPHATE.—In little demand. Price about £26 to £27 per ton, ex quay.  
 COPPERAS, GREEN.—Offered at £3 15s. per ton, f.o.b. U.K.  
 FORMALDEHYDE, 40%.—Little inquiry. Price, £66 to £68 per ton, ex wharf.  
 GLAUBER SALTS.—Moderate inquiry; £4 to £5 per ton, according to quality.  
 LEAD.—Red, £37 15s. per ton; white, £49 15s., per ton, delivered U.K. in 5-ton lots. Continental make offered at £32 per ton, c.i.f. U.K.  
 MAGNESITE.—Finest Euboean calcined about £11 per ton, ex store, spot delivery.  
 MAGNESIUM CHLORIDE.—Offered at £4 10s. per ton, c.i.f. U.K.; spot parcels about £5 10s. per ton, ex store.  
 MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial, £7 5s. per ton; B.P., £9 per ton.  
 POTASSIUM BICROMATE.—Price unchanged, 6½d. per lb.  
 POTASSIUM CARBONATE, 90/92%.—Spot parcels at £29 per ton. Offered at £25 per ton, c.i.f. U.K.  
 POTASSIUM CHLORATE.—Quoted 3½d. per lb., c.i.f. U.K., duty paid.  
 POTASSIUM CAUSTIC, 88/92%.—Spot lots £29 per ton, ex store. Quoted £27 c.i.f. U.K.  
 POTASSIUM NITRATE (SALTPETRE).—Offered at £25 per ton, c.i.f. U.K., prompt.  
 POTASSIUM PERMANGANATE.—Commercial crystals about 8d. per lb.

POTASSIUM SULPHATE, 90% BASIS.—Quoted £13 10s. per ton ex wharf.

SODIUM ACETATE.—Offered at £24 per ton, spot delivery.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay; m.w. quality, £1 per ton less.

SODIUM BICROMATE.—Prices unchanged, 5d. per lb.

SODIUM CARBONATE.—Soda crystals, £5 10s. to £5 15s. per ton, ex quay; alkali, 58%, £8 16s. 6d. per ton, ex station, 5 ton lots.

SODIUM CAUSTIC.—76/77%, £23 5s. per ton; 70/72%, £21 5s. per ton; 60/62%, £20 5s. per ton; 98/99%, powdered, £26 15s. to £27 15s. per ton, ex station.

SODIUM HYPOSULPHITE.—Commercial crystals, about £12 5s. per ton; pea crystals, £18 per ton, ex station.

SODIUM NITRATE.—Refined quoted £12 10s. per ton; f.o.r. or f.o.b. U.K.

SODIUM NITRITE 100%.—£31 per ton, carriage paid.

SODIUM SILICATE, 140°.—Offered from Continent at £8 10s. per ton, c.i.f. U.K.

SODIUM SULPHATE (Saltcake 95%).—Price for home consumption, £4 per ton, on contract.

SODIUM SULPHIDE, 60/62% Conc.—Cheap offers of £14 per ton, c.i.f. U.K.

SULPHUR.—Surplus stocks of Sicilian thirds still available at £3 15s. per ton, f.o.r.; flowers, £12 per ton; roll, £11 per ton; ground, £10 per ton; rock, £10 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 2d. per lb.

ZINC CHLORIDE, 98/99%.—Offered at £30 per ton, c.i.f. U.K.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

BENZALDEHYDE.—Stocks are being offered at 2s. 3d. to 2s. 6d. per lb.

BENZYL CHLORIDE.—Home inquiries. Price 2s. per lb. delivered in returnable drums.

DIMETHYLANILINE.—Some inquiries. Price 2s. 6d. per lb. delivered, returnable drums; or 2s. 7d. per lb. f.o.b. for export.

"G" SALT.—Some inquiries. Price 3s. 4d. per lb. 100% basis, delivered.

NAPHTHONATE OF SODA.—Supplies are offered at 2s. 9½d. per lb., 100% basis, carriage paid.

NAPHTHONIC ACID.—Home inquiry. Price quoted, 2s. 9d. per lb., 100% basis, carriage paid.

NITRO NAPHTHALENE, FUSED.—Home inquiry. Price quoted, 1s. per lb., carriage paid.

PARA DICHLOROBENZOL.—Home inquiries. Price about £40 per ton, delivered.

PARAPHENYLENEDIAMINE BASE.—Home inquiry. Price quoted, 13s per lb., 100% basis, delivered.

### Criticism of the Safeguarding Act

SPEAKING at the Birkenhead Co-operative Hall, on Tuesday, Mr. Alfred Bigland, M.P., said that by passing the Dyestuffs Act the Government had done something to give employment to Britishers, and to build up an industry which was practically dead. Dealing with the Safeguarding of Industries Act, Mr. Bigland declared that the Act was bad because it threw the responsibility on a department of the Government to decide whether the importation of certain goods affected unemployment in this country. In his opinion an Act of Parliament should be so clear that it could not be misread. The solution of the question was a scientific tariff under which duties would be imposed on certain articles of a highly-finished nature. The reason the Act was bad was because it was conceived by a Cabinet which was diametrically opposed one to another. He suggested that the trades unions should solve the problem by endeavouring at the International Trades Union Congress to come to an arrangement with the representatives of other countries under which the differences between the wages and hours of labour in the various countries should be equalised.

## The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, October 12, 1922.

THE chemical market has fully maintained the improved tone reported last week. Home trade buyers are taking what must be regarded as satisfactory quantities in view of the general industrial position and the short-time working in the Lancashire cotton trade.

Foreign demand has shown no indication of expansion. Continental inquiry is small and not of great importance, while the Near Eastern markets are, of course, still under a cloud. Canadian, Australian, and Indian buyers constitute the principal export outlet for chemical products.

### Heavy Chemicals

Caustic soda is still being called for in regular quantities by home users and a fair export business, chiefly Colonial, is being done; quotations are about unchanged at £20 5s. for 60 per cent. material, and £23 5s. per ton for 76 per cent. Soda crystals are quiet but steady at £5 12s. 6d. per ton. Saltcake is easier and little business is passing, the price being now about £4 per ton. Bleaching powder is in moderate demand, both for the home trade and for shipment, at £12 10s. per ton, in softwood casks, at makers' works. Bicarbonate of soda is steady and the price fully maintained at £10 10s. per ton, in 2 cwt. bags. Ammonia alkali is still rather quiet, £7 17s. 6d. to £8 per ton, in bags, being asked for 58 per cent. material for delivery to home users. Sodium sulphide is without change at £20 per ton for 60-65 per cent. concentrated, and about £18 for 60-62 per cent. solid. The demand for hyposulphite of soda has improved a little; British photographic quality is quoted at up to £18 10s., and commercial £10 10s. per ton. Nitrite of soda meets with a fairly active inquiry at £28 per ton. Glauber salts are still a quiet section at £4 10s. per ton. Chlorate of soda is selling satisfactory and 3d. per lb. is still being asked. Acetate of soda is slightly easier at £23 per ton, but business is of small bulk. Prussiate of soda keeps scarce and firm at 11d. per lb. Phosphate of soda is easier at £15 per ton, without much demand.

Caustic potash meets with a moderately active inquiry at about £29 per ton for 88-90 per cent. strength, and £24 for 75-80 per cent. Carbonate of potash is easier at £27 15s. per ton for 90-92 per cent. material. Spot and forward supplies of prussiate of potash continue short, and with the demand maintained prices are firm at 1s. 6d. per lb. for yellow and 4s. to 4s. 3d. for red. There is not a great deal of business being done in bichromate of potash, though prices are steady at 6½d. to 6¼d. per lb. Chlorate of potash is firm and in active inquiry at 4d. to 4¼d. per lb. Commercial permanganate of potash is in good supply and fair demand at 7½d. to 7¼d. per lb.

Sulphate of copper keeps quiet and very little business is passing; £26 to £27 per ton is a representative price here. The demand for arsenic keeps up, and with supplies still scarce prices are very firm, white powdered, Cornish makes, being quoted at £48 to £49 per ton. Commercial Epsom salts are quiet at about £6 5s. per ton, with refined at £8 5s. Acetate of lime is in short supply and prices are firm at £14 10s. for grey and £8 5s. per ton for brown. White sugar of lead is in limited demand but the price is unchanged from last week at £38 per ton, with brown at £34. Flake litharge is in fairly active inquiry at up to £38 per ton. British-made nitrate of lead is firm at £43 to £44. Ammonium muriate is in better demand for home and export consumption at £35 for grey and £40 per ton for white. Sal ammoniac, first and second lump, is quoted at 62s. and 60s. per cwt. Lump alum quiet at about £13 per ton.

### Acids and Tar Products

Tartaric acid is still inactive at 1s. 3d. per lb. Citric acid is also in poor demand at 2s. per lb. for B.P. quality. Acetic acid is firm and in good inquiry at £65 for glacial and £39 10s. per ton for 80 per cent. technical. Oxalic acid is quiet but steady at 7¼d. to 7½d. per lb.

Pitch is in good demand but supplies are scarce, and about £4 10s. per ton, f.o.b. Manchester, is a nominal quotation. Carbolic acid crystals are firm and in active inquiry at 6¼d. per lb. Crude carbolic acid is also in good demand at about 2s. per lb. Solvent naphtha is weak and lower prices are maintained—viz., 1s. 9d. for 90-100 and 1s. 6d. per gallon for 90-100. Creosote oil is firm at 6d. to 6¼d. per gallon. Benzole is steady at 1s. 11d. to 2s. per gallon, but buyers are showing a natural reluctance in view of the drop in petrol.

### Monthly Report by Sir S. W. Royle and Co., Ltd.

Business during September has been disappointing, the improvement in the home trade demand noted during August not having been maintained, but prices on the whole have been fairly steady. The export trade has been only moderate, which can no doubt be attributed to a large extent to the position in the near East. Sulphate of copper has been in limited request for both home and export account, and the price, if anything, is easier. There has been a better call for green copperas, but values are unchanged. Acetates of lime continue in short supply and prices steady, whilst acetic acid is firmer. Acetate of soda has been selling well, but acetates of lead and nitrate of lead have been pressed for sale from recent Continental importations and prices are lower. Carbonate of potash has been in better request, but there are good stocks on this side and values are unchanged. Caustic potash is in only moderate demand. Montreal potashes have a better inquiry, and stocks are small. A steady trade has been done in yellow prussiate of potash, and prices have been fully maintained. Prussiate of soda has been moving freely, and is still scarce, whilst some good business has been done for delivery well into next year. The scarcity in white powdered arsenic still continues, and higher figures are realised. There is little change to record in tartaric acid, although competition from abroad is keen, but stocks are reduced. Cream of tartar also is selling better, especially for export, for which, however, concessions in price have been necessary. Citric acid has been rather slow of sale. Bichromates of potash and soda are unchanged, although competition from abroad is less keen. Business in oxalic acid has been confined to small lots, the future position being somewhat uncertain. There is no alteration in borax and boracic acid, although supplies of B.P. qualities are scarce. Phosphate of soda is dull. Alum and sulphate of alumina are still freely offered at low figures from the Continent. Trade in sal ammoniac is slow, but a fair business has been passing in muriate of ammonia for export and prices are higher, but the home demand is only small. Bleaching powder has been in request, but Continental makes are offering freely. Caustic soda has been in demand for export.

There is little change in tar products. Benzols and toluols are in rather better demand and firmer in tone. If anything, solvent naphtha is easier, the demand for spot parcels having fallen away. Creosote continues steady, though little business is passing, deliveries to America against contracts no doubt helping to keep the position firm.

### The Nitrate Market

In their nitrate market report, dated October 5, Aikman (London), Ltd., state that since September 21 the arrivals amount to about 30,000 tons, and about 20,000 tons are due during the next fortnight. The market has continued quiet, through the influence of international politics and depreciated Continental currencies, which brought out a fair number of resellers. The undertone, however, is very steady, and should the unfavourable outside factors mentioned above disappear the article should promptly respond and a better demand develop.

The American Government put up a quantity of about 26,000 tons ex their reserve stock for public tender on the 29th ult., which was reported sold. The nitrate in question is understood to be in very unsuitable places, and not in very good condition.

The Producers' Association has sold a further 50,000 tons during the fortnight, making their total to date about 910,000 tons. Of this quantity about 750,000 tons were sold for delivery July-October, the balance of 160,000 tons being for delivery November, 1922-June, 1923.

The summary of the position as at September 30 is as follows:—

	1922. Tons.	1921. Tons.	1920. Tons.
Visible supply—			
Europe and Egypt .. ..	294,000	828,000	495,000
United States .. ..	138,000	41,000	194,000
Japan and other countries ..	21,000	11,000	16,000
Stocks in Chile .. ..	1,487,000	1,439,000	1,303,000
Total in sight at Sept. 30 ..	1,940,000	2,319,000	2,008,000

For sulphate of ammonia the market continues firm and unchanged.

## Company News

**CANADA CEMENT CO.**—A dividend of 1½ per cent., less tax, is payable on the common shares on October 16.

**NOBEL INDUSTRIES, LTD.**—The transfer books for the 8 per cent. seven-year secured notes will be closed from October 18 to 31, both dates inclusive.

**GLENBOIG UNION FIRECLAY CO.**—A dividend of 20 per cent., less tax, is declared for the past year; £3,000 is placed to depreciation, and £11,979 is carried forward. The annual meeting will be held at 48, West Regent Street, Glasgow, on October 20, at noon.

**EVANS SONS LESCHER AND WEBB, LTD.**—A general meeting of the holders of debenture stock will be held at 56, Hanover Street, Liverpool, on October 17, at 2.30 p.m., for the purpose of considering and, if thought fit, approving of the appointment of new trustees.

**ARIZONA COPPER CO.**—The directors have declared a dividend of 1s. per share, free of tax. The dividends from the Phelps Dodge Corporation amounted to £45,000. While the company's claim for repayment of £361,000 excess profits duty has been admitted by the Government, and a substantial instalment paid, the Government claim for income tax, involving large figures, has to be adjusted, and the basis of past and future assessment has to be settled.

**RIO TINTO CO., LTD.**—Out of the estimated profits of the year 1922, the directors have declared an interim dividend of 10s. per share on the ordinary shares, and have also declared the usual interim dividend for the six months ended June 30 last, of 2s. 6d. per share on the 5 per cent. preference shares. Both dividends are payable November 1 next, less English income-tax. The share transfer books will be closed from October 14 to 31 inclusive. The share warrant coupons to be presented are No. 51 on the preference and No. 46 on the ordinary shares. This is the first payment on the ordinary shares since April, 1920, when £1 per share was distributed, making £2 per share for the year 1919.

**ALIANZA CO., LTD.**—An interim dividend of 20 per cent. on account of profits for the current year having been declared by the directors in Valparaiso, warrants in respect thereof (less income tax) will be posted on November 2 to registered shareholders in the United Kingdom. The transfer books will be closed from October 19 to November 2, both days inclusive. Holders of share warrants will receive payment of Coupon No. 6 on or after that date at the offices of the company in London or Valparaiso. Coupons payable at the London office will be subject to deduction of British income tax at the rate of 5s. 3d. in the £, and must be left three clear days for examination. They may be lodged any day (Saturdays excepted) between the hours of 11 and 3.

**COLOIL SYNDICATE.**—The report for the period from the incorporation of the company, January 31, 1921, to May 31, 1922, states that, in accordance with the terms of the original prospectus issued on February 3, 1921, William Dickin and Co. become entitled to subscribe for the 100,000 unissued shares of the company at par, and such option has been duly exercised and the shares allotted, making the issued capital £15,000. Negotiations for taking over the company's interests in Colombia are proceeding satisfactorily. The company, upon the advice of Mr. R. E. Way, has taken an interest in an oil property in the northern part of Spain. In view of this interest the directors propose that the capital of the company be increased to £75,000 by the creation of 1,200,000 shares of 1s. each. The ordinary general meeting was to be held yesterday at Winchester House, London, E.C.

**OILFIELDS OF EGYPT.**—The report to March 31 last states that during the year drilling operations were continued on Ras Dhib and Ras Bahar areas. Two boreholes which were being sunk at Ras Dhib in March, 1921, were carried to a depth of 577 ft. and 786 ft. respectively by March 31, 1922. A well was commenced at Ras Bahar in February, 1922, and at the end of March last had reached a depth of 483 ft. Progress was necessarily very slow owing to extremely hard formation encountered. Developments to March 31 last had not proved the existence of oil in commercial quantity, although small shows of oil were encountered at various depths during drilling operations. Since the accounts were made up field work has been pushed forward as rapidly as the nature of the ground permits, but the results achieved are not yet conclusive, and deeper drilling will be necessary to prove productiveness of

lower strata. The whole of the general expenditure in Egypt and in London, less interest, etc., has again been carried to development account. The annual meeting will be held at Winchester House, London, E.C., on October 16, at noon.

**BRYANT AND MAY, LTD.**—There was offered to the public on Wednesday, by Bryant and May, Ltd. £750,000 5 per cent. debenture stock at 93 per cent., repayable in 1942, with the option reserved to the borrowers of redeeming in or after 1932. Part of the proceeds will be utilised in repaying or refunding an existing amount of £300,000 7½ per cent. five-year notes that were made redeemable between 1922 and 1925. Holders of these notes can exchange their holdings for a similar amount of the new debenture stock, and will receive an immediate cash payment of £11 13s. 9d. per cent., being £9, the difference between the redemption price of the 7½ per cent. notes and the issue price of the new debenture stock, plus £3 11s. 8d. per cent. (less tax), difference of interest. The issue is also being made to finance recent acquisitions by the company, including the control of the British and Canadian business of Maguire, Paterson, and Palmer. From the figures embodied in the prospectus it appears that the issue is covered more than three times as to principal and (taking a seven-years' average basis) more than four times as to interest, apart from the profits of the new subsidiaries. The issue was heavily over-subscribed and the lists were closed on Wednesday.

## Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OR FIRM OR AGENT.	MATERIAL.	REF. No.
Chicago . . . . .	Druggist's sundries	391
Mexico . . . . .	Drugs and druggists' sundries	398
Switzerland . . .	Chemicals for the paper, textile and tanning industries	388

## Tariff Changes

**GERMANY.**—The surtax levied when the "gold" duties of the German Customs Tariff are paid in paper currency was reduced to 34,400 per cent. for the period September 27 to October 3.

**POLAND.**—The Customs duties on vanilla and saffron, even crushed or powdered, and perfumery and cosmetics and toilet and medicinal soaps, are increased by a surtax of 79,900 per cent.

## New Dangerous Drugs Regulations

THE Home Secretary gives notice that he has made new regulations under the Dangerous Drugs Act, 1920, amending the regulations already in force. These amending regulations come into force forthwith. Copies may be obtained through any bookseller or direct from His Majesty's Stationery Office. The object of these amending regulations is to correct certain defects which have been shown to exist in the original regulations of May 20, 1921. Thus: "The persons authorised to give prescriptions for dangerous drugs may no longer prescribe for themselves." This regulation, which has the concurrence of the General Medical Council, is made because several cases have recently come to the Secretary of State's notice in which medical men who were victims of the drug habit procured considerable quantities of cocaine and morphia by giving prescriptions made out to themselves. It will not, of course, in any way affect a doctor's existing powers of procuring the drugs for use in the practice of his profession. It is made an offence to attempt to obtain the drugs to which the Act applies. It is intended to deal with the case of a person who tries to obtain drugs from a pharmacist by misrepresentation even though the pharmacist discovers the fraud before actually parting with the drugs. Further, persons dealing in the drugs are required to preserve for two years all prescriptions, records, &c., which the Act and regulations direct them to keep.

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

AINSWORTH, Charles Anderton, 20, New Chapel Street, Mill Hill, Blackburn, varnish manufacturer. (C.C., 14/10/22.) £38 is. 7d. September 7th.  
ART DYEING CO., 9A, Colebrook Row, Islington, dyers. (C.C., 14/10/22.) £41 8s. 6d. July 31st.  
PYE, Harry, 18, Bridge Street, Spalding, chemist. (C.C., 14/10/22.) £37 16s. 2d. September 6th.

### Satisfactions

HACKFORD, —, 37, Mecklenburgh Square, W.C., chemist. (C.C.S., 14/10/22.) (Satisfied October 6th, 1922.) £39 8s. 10d. May 29th.

### Bill of Sale

COOPER, Samuel (and Florence COOPER, his wife), Brookside, Eastwood Road, Leigh-on-Sea, druggist. (B.S., 14/10/22.) October 6th. £70.

### Deed of Arrangement

FERRIS, Bertie, trading as THOMAS SMITH, the PEOPLE'S DRUG STORES, 84, North Street, Bedminster, druggist. (D.A., 14/10/22.) Filed October 6th. Trustee: P. S. Booth. 14/17, Holborn Viaduct, London, E.C., accountant. Liabilities unsecured £605; assets, less secured claims, £400.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

LOWE (THOS. ALEXANDER) AND CO., LTD., Liverpool fertiliser merchants. (M., 14/10/22.) Registered September 27th, debenture to Manchester and Liverpool District Banking Co., Ltd., securing all moneys due or to become due to the bank; general charge.  
NORTH BRITISH FERTILISER CO., LTD., Liverpool. (M., 14/10/22.) Registered September 27th, debenture to Manchester and Liverpool District Banking Co., Ltd., securing all moneys due or to become due to the bank; general charge.  
STELLA GILL COKE AND BYE-PRODUCTS CO., LTD., London, E.C. (M., 14/10/22.) Registered September 29th, £6,300 debentures part of £300,000; general charge (except uncalled capital). \*£114,300. June 21st, 1922.

### Satisfaction

BRITISH CELLULOSE AND CHEMICAL MANUFACTURING CO., LTD. (late BRITISH CELLULOSE AND CHEMICAL (PARENT) CO., LTD.), London, S.W. (M.S., 14/10/22.) Satisfactions registered September 29th, £3,000 registered August 4th, 1921; £13,500, registered August 8th, 1921; and £150,000, registered January 9th, 1922.

### Receivership

LANCASHIRE AUTOMATIC GLASS MANUFACTURING CO., LTD. (R., 14/10/22.) W. Bolton, of 46, Pall Mall, Manchester, has been appointed receiver and manager by Order of Court dated September 29th, 1922, and under powers contained in trust deed dated August 9th, 1921.

## London Gazette

### Company Winding up Voluntarily

REVILL'S DRUG STORES, LTD. (in liquidation). (C.W.U.V., 14/10/22.) W. H. Izod, St. Issey, Stanley Road, Hornchurch, appointed liquidator. Meeting of creditors, 181-183, High Street, Hornchurch, Friday, October 20th, 4 p.m.

### Partnerships Dissolved

THE ESITOL CHEMICAL CO. (Frederick Charles WOOD and Mathew Robert Henry HALE), chemical merchants and manufacturers, 181, Queen Victoria Street, E.C., by mutual consent as from September 18th, 1922.

PAUL JANTZEN AND CO. (Ottomar Richard JANTZEN and George Herbert WATTSON), colour and chemical merchants, 133, Fenchurch Street, London, by mutual consent as from September 30th, 1922. Debts received and paid by G. H. Wattson.

### Notice of Dividend

HALL, Howard Ephraim, 41, George Street, Luton, under the style of HALL AND SONS, chemist and druggist. Amount per £. 8½d. (instead of 1s. previously announced). First and final. Payable October 20th, 11, George Street West, Luton.

## New Companies Registered

BURROUGHS, WELLCOME AND CO. (SOUTH AFRICA), LTD., 67, Holborn Viaduct, E.C. Chemical manufacturers and dealers; wholesale and retail chemists and druggists, etc. Nominal capital, £20,000 in £1 shares.

DRY-CLENE, LTD., 11, Albion Place, E.C. Manufacturers and sellers of Dry-Clene powders for the cleaning of glass and plate, etc. Nominal capital, £1,000 in £1 shares.

HEXHAM CHEMICAL MANURE CO., LTD. Manufacturers of and dealers in chemical, vegetable and other manures, manurial products and fertilisers, etc. Nominal capital, £2,000 in £1 shares. Managing director and secretary: W. J. Thirlwell.

MAXIMON, LTD. Manufacturers of and dealers in lacquer, varnish, alcohol, methylated and other spirits, oils, paints, scientific chemicals and colours, etc. Nominal capital, £20,000 in £1 shares. A director: L. J. Simon, 21, Pantom Street, S.W.1.

NOVELTY IMPORTS, LTD., 8-9, Chiswell Street, E.C. Dealers in chemicals, oils, etc. Nominal capital, £100 in £1 shares.

O-PINE-O MANUFACTURING CO., LTD., 30a, Montague Road, Hornsey, N., soap manufacturers. Nominal capital, £5,000 in £1 shares.

OROTOL, LTD., 31, Hydethorpe Road, Balham, S.W.12. Manufacturers of tooth and other powders. Nominal capital, £200 in £1 shares.

PANOLINE MANUFACTURING CO., LTD., West Bank Works, West Bank, Barking. To carry on the business of blenders of fats and oils; oil importers, chemical merchants, etc. Nominal capital, £12,000 in £1 shares (2,000 8 per cent. cumulative preference and 10,000 ordinary).

PARKER, WARD AND CO., LTD., 35, Bedford Row, W.C. Manufacturers of and dealers in an aqueous sulphur solution for making medicinal preparations for the treatment of certain human and animal diseases; chemists, druggists, etc. Nominal capital, £6,500 in 5,000 preference shares of £1 each, and 30,000 ordinary shares of 1s. each.

PEARSON AND DORMAN LONG, LTD., 14, Old Jewry Chambers, E.C. Manufacturing chemists, manufacturers of and dealers in chemical manures, fertilisers, oil products, dyes and by-products of all kinds, etc. Nominal capital, £500,000 in £1 shares.

PELICAN MILLS CO., LTD., 321, Stretford Road, Manchester. Manufacturers of chemicals, dyes, soaps, starches, etc. Nominal capital, £1,500 in £1 shares.

THE SIBOLGA SYNDICATE, LTD., 5 and 7, Eastcheap, E.C.3. Refiners, producers, extractors and suppliers of oil and oil products. Nominal capital, £6,250 in £1 shares.

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